OLD!

retro GAMER Presents

ULTIMATE FLASHBACK To The 80s

TAKE A TRIP THROUGH TIME BACK TO GAMING'S MOST-LOVED DECADE

Inside the COMMODORE 64

Digital Edition

FUTURE

FIRST EDITION

HARDCORE HARDWARE ◂ INCREDIBLE GAMES ◂ AWESOME ARCADES ▾ RETRO REVIVALS ▾ & MORE

LOADING...
VOLUME

WELCOME

Get ready to head on a nostalgic trip to the world of Eighties videogaming. In this special time-bending bookazine, prepare to head back to a time when pixels ruled the screens, thumping arcades were the place to be and gaming heroes like Mario were becoming household names.

We will explore the games that defined the decade, from coin-gobblers like Pac-Man to home computer icons like Miner Willy and console powerhouses like *The Legend Of Zelda*. That's not all, though: we'll explore the machines that played host to these games, such as the NES, Master System, Commodore 64 and more. And, of course, we'll drill down into the specific elements that made this decade so special to experience firsthand.

So, let's bounce and get ready to relive the most awesome, supreme and bodacious decade in gaming history!

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CONTENTS

06 BACK TO THE 80s

20 THE 80S: A DECADE OF INCREDIBLE GAMES

32 PAC-MAN: GAMING'S FIRST ICON

40 FLASHBACK: ATARI 2600

42 ARCADE PERFECT: DONKEY KONG

44 INSIDE THE COMMODORE 64

50 CRACKING THE SCENE

54 FLASHBACK: HOME COMPUTER HEAVEN

56 HARDWARE HEAVEN: ZX SPECTRUM

58 ULTIMATE GUIDE: JET SET WILLY

64 HARDWARE HEAVEN: MASTER SYSTEM

66 FLASHBACK: RISE OF NINTENDO

68 INSIDE THE NINTENDO ENTERTAINMENT SYSTEM

80 MARIO: PLATFORM SUPERSTAR

88 FLASHBACK: CONVERSION CAPERS

20

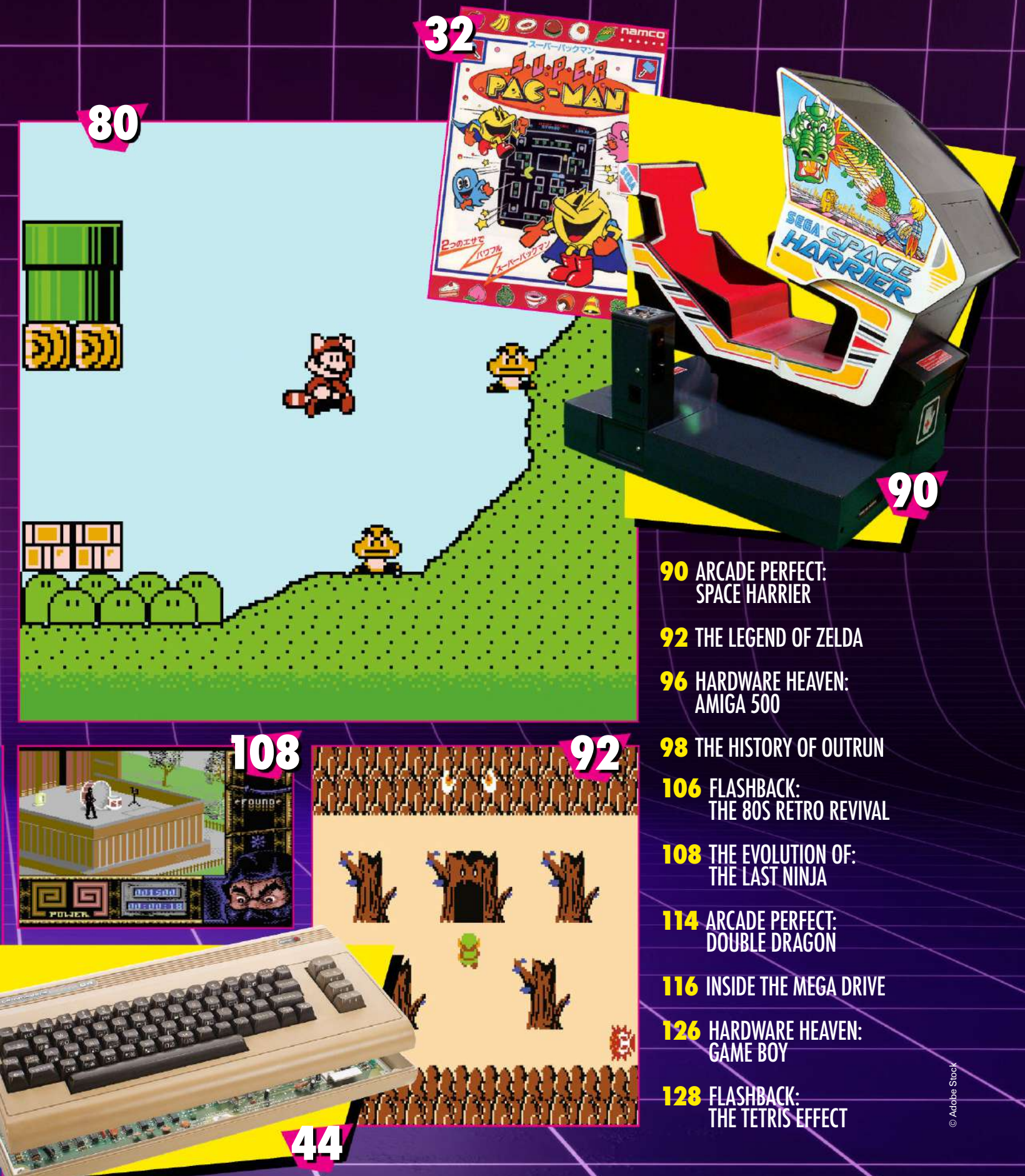
50

98

40

66

58



90 ARCADE PERFECT: SPACE HARRIER

92 THE LEGEND OF ZELDA

96 HARDWARE HEAVEN: AMIGA 500

98 THE HISTORY OF OUTRUN

106 FLASHBACK: THE 80S RETRO REVIVAL

108 THE EVOLUTION OF: THE LAST NINJA

114 ARCADE PERFECT: DOUBLE DRAGON

116 INSIDE THE MEGA DRIVE

126 HARDWARE HEAVEN: GAME BOY

128 FLASHBACK: THE TETRIS EFFECT

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BACK TO THE 80s

ALTHOUGH IT STARTED IN THE SEVENTIES, GAMING TRULY EXPLODED IN THE EIGHTIES AND IN DOING SO, IT DELIVERED SOME OF OUR BEST GAMING MEMORIES, FROM BUDGET TITLES TO MAGAZINES CRAMMED WITH THE LATEST REVIEWS. HERE, ICONOCLASTS FROM THE PERIOD EXPLAIN WHY IT WAS SUCH A GREAT DECADE

WORDS BY DARRAN JONES AND NICK THORPE

Everyone has their favourite period for gaming, whether it's the embryonic stages of the Seventies, or the three-generation span of the Nineties that saw 8-bit systems fade away while 32-bit consoles kicked off the 3D revolution. For many of you reading this, we're guessing the Eighties was your favourite era of gaming, and in all honesty, it's easy to understand why.

While there were great games and hardware around in the Seventies, everything exploded in the following decade and the wealth of choice was truly staggering. Home computers largely dominated this period, building on the foundations that had been started in the previous decade by companies like Apple, Atari and Commodore. As home micros became more affordable in the Eighties and highlighted the strengths of videogames, computer magazines became prolific and many focused more on games, delivering type-ins you could try out, and later supplying cover tapes with independent and commercial games on them.

This influx of home computers naturally led to youngsters wanting to push the limits of what was possible, and as a result, bedroom coders began to appear. John Romero and Jordan Mechner were just a few of the coders tinkering away in the US, primarily on Apples and Ataris, while various Sinclair, Amstrad and Commodore systems paved the way for the likes of David Perry, the Oliver twins and Jeff Minter in the UK.

The Eighties was also a period when the gaming industry began to 'grow up'. While big companies like Apple, Activision, Commodore and Atari certainly existed in the Seventies, more and more publishers appeared in the following decade. Ordering games by mail order was still possible, but it was becoming increasingly easier to find games in shops and even your local newsagent.

While a multitude of computers were released in the Eighties, let's not forget the consoles of the period. Atari was a prevailing force with various systems from the 5200 to the Lynx debuting in the decade, and while the US console crash affected the industry, the Atari name remained synonymous with gaming for most of the Eighties, and it was only matched by Nintendo after the Japanese giant began to dominate the US post-crash. Sega's Master System fared better in Europe, and by the latter half of the decade, it was obvious that consoles were on the rise, although many of those 8-bit systems struggled to take the shine off the 16-bit computers that began appearing during the mid-Eighties.

As the decade continued, genres began to evolve, or even appear, while arcades continued to lead the hardware charge that had commenced in the Seventies. Developers began to think outside the spaceship and vehicle avatars that had become so popular in the previous decade, and actual characters began to appear, some of which are now the most recognisable stars in the world. The following pages will highlight the above, and many other aspects of the decade which made the gaming scene so much fun to be a part of. We hope you enjoy the ride. ▶

MY FAVOURITE LOADING SCREENS

OCEAN ARTIST **MARK R JONES** ON HIS FAVOURITE COMPUTER ART

ESKIMO EDDIE BY F DAVID THORPE
ZX SPECTRUM, 1984

"One of the very first screens I ever saw where some precise work into the placing of the attributes had been done. I thought this looked beautiful at the time and showed me how good a loading screen could be if done by someone with the right skills."

THE BRAT PACK

ALISON BEASLEY
PR for Mastertronic

GARY BRACEY
Software Director for Ocean Software

JULIAN 'JAZ' RIGNALL
Games journalist for *Zzap64!*

CHRIS ABBOTT
Owner of C64 Audio

DAVID CRANE
Cofounder of Activision

PAUL HUGHES
Graphics artist for Ocean Software

PHILIP OLIVER
Co-creator Of Dizzy

HARDCORE HARDWARE

WHILE IT'S THE GAMES EVERYONE LOVES, A BIT OF 'MY MACHINE'S BETTER THAN YOURS' IS ALWAYS FUN – AND IN THE EIGHTIES, THERE WAS A GREATER CHOICE OF HARDWARE THAN EVER BEFORE OR SINCE. WE PRESENT A SELECTION OF THE MOST NOTABLE MACHINES

PC
1981
The PCs you play today bear little resemblance to IBM's original machine, and it took years to come into its own as a gaming platform, but the clones changed computing forever.

VIC-20
1981
Commodore's home computer was a brief phenomenon, becoming the first computer to ever sell a million units. Soon superseded, it still provided many with a great first experience.

ZX81
1981
Available in prebuilt and kit forms, Sinclair's follow-up to the ZX80 was incredibly limited but very cheap. Most games of note required the 16K RAM pack add-on to even run.

BBC MICRO
1981
Acorn's 8-bit computer was a fixture in schools and saw plenty of educational games, but its high price made it a hard sell for home audiences. That said, *Elite* will always be great.

VECTREX
1982
GCE's self-contained console boasted a vector display, allowing for a true arcade look. It was well-received by critics, but the prevailing market conditions cut it down before its time.

ZX SPECTRUM
1982
By adding colour graphics capabilities to its newest machine while retaining a low price point, Sinclair created a huge hit in the UK and other European markets.

COMMODORE 64
1982
This machine's power, combined with Jack Tramiel's willingness to undercut the competition, meant that for many years it was the best-selling computer ever made.

MSX
1983
This attempt to provide a computing standard never took off as envisioned, but was popular in places such as Japan and the Netherlands, and supported well by the likes of Konami.

MACINTOSH
1984
The first in Apple's line of computers was not really aimed at our audience, with its monochrome display, but some fun games allowed business types the occasional distraction.

SINCLAIR QL
1984
Sir Clive's attempt to hit the business market met with hardware problems and little interest, while a lack of games put off the Spectrum audience. Sinclair Research never recovered.

AMSTRAD CPC
1984
Alan Sugar's box of tricks couldn't overcome the head start its rivals had, but was a very capable machine in the right hands, with colourful (if chunky) graphics.

NES
1985
After taking the lead in Japan's console market with the Famicom, Nintendo brought its 8-bit hardware west and revived the American console market with a monstrous hit.

PC ENGINE
1987
Hudson Soft's efficient chip design crammed a huge amount of power into a small space. Magazine coverage sent readers crazy, but it never officially hit British shores – a real tragedy.

ATARI XEGS
1987
A direct console version of the Atari 8-bit range, which attempted to bridge the gap between the computer and console markets. A neat idea, but not one which had lasting power.

ACTION MAX
1987
This console hooked up to your VCR to provide lifelike gaming, but the reality was so limited as to be barely interactive at all. It garnered little interest then, and that hasn't changed.

MEGA DRIVE
1988
Sega's 16-bit hit offered near arcade-quality graphics in the home, but software support – and a UK release – took a while to arrive. By the time they did, the Nineties had already begun.

COLECOVISION
1982
Bringing the fight to Atari, Coleco leaned on quality arcade conversions and a range of hardware add-ons. A promising start was scuppered by the videogame market crash of 1983.

ATARI 5200
1982
This successor used the powerful Atari 8-bit home computer as its basis. A lack of backwards compatibility and dodgy joysticks meant that it soon struggled in the marketplace.

DRAGON 32
1982
Made in Wales and bearing the patriotic branding to prove it, this machine was initially quite popular but limited capabilities stifled it. Dragon Data would fold two years later.

SG-1000
1983
Sega's first home console offered similar capabilities to the ColecoVision – which immediately put it behind Nintendo's Famicom. It sold better than expected, but was quickly outmatched.

ORIC-1
1983
This surprise success for Tangerine Computer Systems sold particularly well in the UK and France by matching Sinclair's pricing, giving way to the Atmos – a flawed and failed successor.

ACORN ELECTRON
1983
The BBC Micro's cut-down cousin wasn't a patch on the real thing, but while it didn't trouble the bigger players, it did offer enough value that it found a loyal audience in the UK.

AMIGA
1985
Commodore's line of 16-bit computers offered strong multimedia capabilities, but at a price. The line didn't take off as a gaming platform until 1987's cheaper Amiga 500.

ATARI ST
1986
Atari's 16-bit computers were cheap enough to ensure a wide audience was built quite quickly, but its weaker gaming capabilities saw it fall behind the Amiga after the Eighties.

MASTER SYSTEM
1986
Rebranding its Japanese Mark III hardware, Sega followed Nintendo west. It was the leading console in Europe, at a time when consoles played second fiddle to computers.

ATARI 7800
1986
Shelved following a test launch, the 7800 was a far better successor to the Atari 2600 than the 5200 had been. Unfortunately, its sound capabilities left a lot to be desired.

FM TOWNS
1989
Fujitsu's computer had a 32-bit CPU, a built-in CD-ROM drive, a beautiful design and plenty of desirable games. What more could you want? Well, a UK release would have been nice.

GAME BOY
1989
Nintendo's modest handheld pulled no punches when it came to software. With *Tetris* and *Super Mario Land* at launch, its cost and battery life advantages were just icing on the cake.

LYNX
1989
Atari's colour handheld was a true powerhouse, offering features that home hardware couldn't provide. Hungry for batteries and starved of software, it fell behind the competition.

SAM COUPE
1989
Hosting an 8-bit CPU while boasting of 16-bit performance, this machine from Miles Gordon Technology missed the Christmas rush and its owners were bankrupt by the summer.

MY FAVOURITE LOADING SCREENS

RENEGADE BY MARK K JONES
AMSTRAD CPC 1987
"It's still as good as when I watched Mark draw this while at Ocean. I'd never seen an Amstrad loading screen look this good before. Approaching his desk from a distance, it could have been a screen on the ST or Amiga. It was only when you got closer that the blockiness became apparent. It shows a use of colour unsurpassed on the Amstrad. It's an amazing piece of work."

AWESOME ARCADES

IN THE EIGHTIES, IF YOU WANTED THE ULTIMATE IN GRAPHICAL TECHNOLOGY AND BRUTAL CHALLENGE, THERE WAS ONLY ONE PLACE TO GO – YOUR LOCAL ARCADE. WE LOOK BACK AT AN AGE WHERE THE COIN-OP SCENE WAS STILL THE ENVY OF THE GAMING WORLD

» [Arcade] Cabinets had to be built to take abuse – not just cigarette burns and spilt drinks, but also hardcore button punishment.

During the Eighties, computers of any kind were expensive, and they had to be built for a general purpose. Not so with arcade machines – every penny spent on making them was geared towards ensuring that they were really, really good at running games. As a result, they technologically outstripped anything in the home. "That was the main allure of arcades – being able to spend a few coins to play something that was so far more advanced than the microcomputer and console titles of the period," says Julian Rignall, an arcade expert who went on to a career in games journalism. "Games like *Pole Position*, *Dragon's Lair*, and *Star Wars* were all a quantum leap ahead of what was available for home systems and they all delivered stunning gameplay experiences that were immersive, addictive and tremendously exciting. That was an incredibly strong draw for any red-blooded gamer."

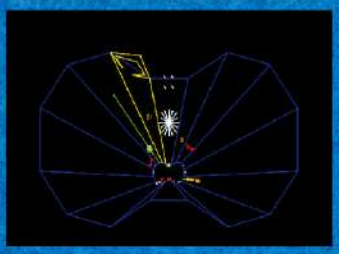
Of course, going to the arcades also meant getting out of the bedroom. "If you went to an arcade regularly, you'd inevitably get to know the other players that frequented the place because you'd chat to them while waiting your turn to play a particular game," says Julian. "For me, it was akin to some kind of gaming club, and I feel many provincial arcades offered that kind of experience to their regulars." Of course, getting enough guys into a room together inevitably meant that competition broke out, and Julian thrived in that environment. "I was very lucky in that my local arcade had some really good players who regularly frequented the place, and that made for a very competitive scene. We were constantly trying to beat each other's high scores and we'd keep records on who had the highest score on which machines." But the competition was friendly, and tips were shared openly. "I think much of that was to do with the fact that one's gameplay experience was public – people could and would simply stand there and watch you play, especially if you were good at a game."

The excitement when a new game was arriving was palpable. "We always knew when there was going to be a new delivery because the arcade technicians would start moving machines about to make room for the new one, and at that point we'd start asking questions," Julian recalls. "Was it an upright or sit-down cabinet? Had they played the game or did they know what it was?" But without the kind of hype cycle that games have today, each game was an unknown quantity until the engineer switched it on. "Once he'd checked that it was working fine, it would be turned over to us players so we could start playing. And that's when things would start getting very exciting as we began to figure out how to actually play the game. In cases such as *Mr Do!*, *Dig Dug*, *Frogger*, and *Pac-Man*, they were new concepts at the time and it took a good few tries to get the general gist of their gameplay. But that was part of the fun – figuring out how to play each game and deciding whether or not it was entertaining and worth piling coins into."

As the decade wore on, manufacturers produced increasingly elaborate cabinets. "While I enjoyed playing them, they were always a bit gimmicky to me," says Julian. "The showcase coin-ops always cost a lot more to play than 'regular' arcade games, and while they usually delivered a very exciting and intense experience, their gameplay was generally short. Unlike titles like *Defender*, *Asteroids*, and *Missile Command* that could be played for hours on a single credit, games like

INCREDIBLE INNOVATIONS

THE TECHNOLOGICAL DEVELOPMENTS THAT KEPT PLAYERS REACHING FOR THAT NEXT 10P PIECE



COLOUR VECTOR GRAPHICS

Games with raster displays had gone colour some years ago, but *Tempest* proved that you needn't forego beautiful, crisp lines just for a splash of colour. Games like *Star Wars* would cement the technology in the hearts of gamers everywhere, but alas, it wasn't long for the world and was abandoned before the decade's end.

LASERDISC GAMES

By using discs that stored high-quality video, arcade games could achieve unprecedented graphical detail – albeit at the expense of interactivity. Sega's *Astron Belt* introduced the technology, but *Dragon's Lair* beat it to market and kickstarted the craze properly, thanks in large part to some sumptuous Don Bluth animation.

» [Arcade] While multiplayer gaming and the arcades are inextricably intertwined, the Eighties saw more games going beyond two players.

» [Arcade] Late Eighties games like *Golden Axe* show the pace of progress in the arcades pretty well.

After Burner, *Out Run*, and *Space Harrier* all had distinct endings that limited your play time." But plenty of classics still needed just a stick and buttons, from *Wonder Boy* and *Strider* to *Rolling Thunder*, *Contra* and *The New Zealand Story*.

But it's the blasters that top Julian's personal high score table. "*Robotron: 2084* is simply the sheer essence of a shooter distilled down into a frenzied single-screen experience. The rate that you mow down the robotic enemies is incredibly satisfying, and I love the various behaviours of the different denizens – they really test your skills and reflexes to their limits," says the arcade veteran. "And then there's *Defender* – which I think is perhaps the greatest shooter ever made," he continues. "Whether you're thrusting along at full speed mowing down swarms of Landers, avoiding the attentions of a pursuing Baiter, or trying to fly through a hail of ordnance to pick up a falling astronaut, *Defender* offers a simply sensational shoot-'em-up experience." ▶

MY FAVOURITE LOADING SCREENS

GHOSTS 'N GOBLINS BY STE PICKFORD
COMMODORE 64 1986

"I loved this version of the game. One of the only games that made me wish I had a C64. I used to play it in the computer shop I frequented. I loved the music in it, and this loading screen was miles better than the one attached to the version of it I played at home."

PREACHING OF THE CONVERTED

MINDWARE'S **MIKITO ICHIKAWA** TALKS ABOUT THE ART OF BRINGING ARCADE GAMES TO THE HOME

We understand that arcade games inspired you to begin developing games. Could you please tell us about that?
The first action game I played was *Space Mouse* for the PC-8001 at a PC shop. At the time, I was interested in computers because I wanted to make them do aerodynamic calculations. My first personal computer was a dead copy board of MZ-80. In the midst of all this, Namco's *Dig Dug* started to catch on and I went to see it. I'd played *Space Invaders* and *Asteroids* before that, but the impact of *Dig Dug* was immense, and I've been making games ever since.

Were there any conversions of arcade games that you thought were impressive in the Eighties?
There are a lot of them. What I was particularly impressed with was *Mappy* for the PC-6001 MKII. The logic of the enemy was firmly based on the arcade version, the pattern of the map was made as similar as possible. There were many conversions that did not have bonus stages such as NES and MSX, but the bonus stage was also reproduced, and it was a conversion with a very high degree of completion.

When converting games like *Slap Fight*, how did your process differ from today?
Nowadays, it's an emulation port. On the other hand, when it comes to *Slap Fight*, the Mega Drive is significantly less capable than the original hardware, so it couldn't be developed in the same way. The source code was very helpful in porting *Slap Fight* with detailed character movement logic and lots of hidden features. However, the source code was handed to me on a printed piece of paper, so I had to go through everything, which was a lot of work. […] As for the music, I was provided with a handwritten copy. Since it was a score, not data, it was only a reference and it took a lot of time to reproduce every detail.

You have now brought a number of classic arcade games to modern platforms. Why do you think players are still interested in playing arcade games from the Eighties?
Recently, the development budgets of the major publishers' games have skyrocketed. This makes the graphics and sound gorgeous, but since players know that new games have more gorgeous graphics and sound than the old one, there aren't that many surprises. I was shocked when *Tetris* appeared in the late Eighties and surprised when *Minecraft* appeared in the Noughties. I think there are a lot of surprises like this in Eighties games. Whenever I release a ported version of an old game, I always make a version that goes beyond the arrangement and can be called the 'Ultimate Evolved Version', and I do this because I want you to experience the surprises you experienced in the Eighties.

FILLED POLYGONS

▶ Dave Theurer's *I, Robot* introduced the technology that would ultimately come to dominate videogame graphics in 1984, but it didn't do particularly well for Atari. 3D graphics technology started to become more popular towards the end of the decade, thanks to racing games like *Winning Run* and *Hard Drivin'*.

MOTION CABINETS

▶ The trend for full-body experiences began with *Hang-On*, which required players to steer a replica bike, but soon saw games turned into miniature theme park rides. From the hydraulic seats of *Space Harrier* and *Out Run* to the spinning base of *WEC Le Mans*, plenty of games implemented physical experiences.

LINKED MULTIPLAYER

▶ Playing a game with a friend is fun, so playing with more friends is surely more fun, right? That was Namco's reasoning when introducing *Final Lap*, a twin sit-down racing cabinet that could be linked for up to eight players to enjoy. These days, it's a feature that no respectable arcade racer can omit.

CREATING CHARACTER

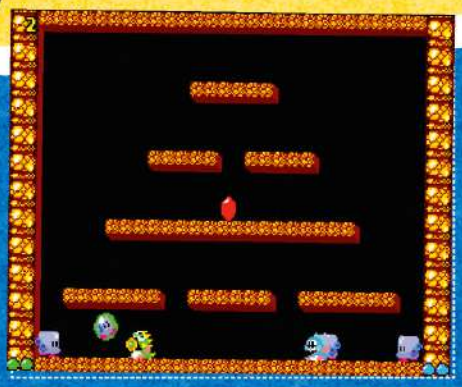
THE EIGHTIES SAW AN EXPLOSION IN RECOGNISABLE VIDEOGAME CHARACTERS, INSPIRED BY THE CARTOON CHARACTERS BELOVED BY KIDS WORLDWIDE. WE LOOK BACK AT THE WHY GAMING HEROES BECAME SO IMPORTANT

When you look at the growth of gaming during the Eighties, so much of it is driven by the popular characters of the era. While abstract games were still capable of becoming huge hits – just look at *Tetris* – companies that found their star character could rake in tens of thousands of sales, maybe even millions. If that happened, the chances were they would prosper for a long time to come. When Hollywood eventually came knocking in the Nineties, the first projects to make it to the screen featured characters conceived in the Eighties – Mario, Billy and Jimmy Lee of *Double Dragon*, and *Street Fighter*'s Ryu.

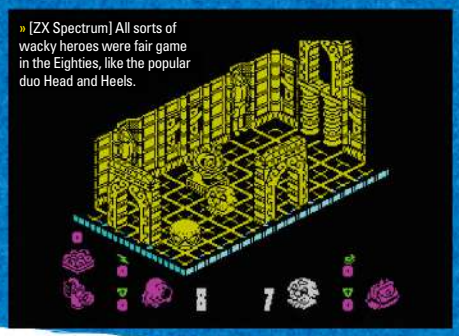
But why were characters so important, and what was it about the Eighties that allowed them to prosper? "People connect better with personalities than machines or abstract objects. Even though the graphics were basic back in the Eighties, we all had imaginations that filled in the details," says Philip Oliver, co-creator of the *Dizzy* games. Until the very end of the Seventies, graphics technology didn't really offer sufficient levels of detail and animation to convey character. "It was hard to relate, or get excited about the cannon in *Space Invaders*, or a low resolution, top-down car or tank," Philip continues. "Then Pac-Man, Jump Man (later called Mario), Smurfs (one of the first character games we saw on an Atari 2600 – which amazed us) came along and even though the game itself didn't show the character in much detail, the box art, and sometimes the loading screen helped fill in the gaps."

Of course, creating a memorable character is far from a simple task. "For a character to become memorable it needs to be unique and a bit quirky! Dizzy achieved this by being a large happy face on legs… which everyone decided was an egg," says Philip. "His energetic movement and facial animations (tough to do on characters in low resolution games) gave him a fun personality that captured player imaginations – *eggsactly* as we hoped for!" Once the character is set, the game designed around them comes with its own considerations. "You think about the game as a world, a place in which your character needs to live and move around. So many decisions now revolve around this, his appearance dictates the art style, the gameplay mechanics revolve around what he looks like he's capable of doing," Philip explains. "The story and missions need to put him, or her, central to the events."

With gaming seen as a hobby for young people at the time, many of the characters back then resembled cartoon characters in their design. "Pac-Man was the first videogame character as far as we're concerned, but other popular characters for us included Frogger, Q*Bert, Mr Do (a clown), Chucky Egg, Manic Miner, Frak! and Thing On A Spring." On the consoles, a different set of stars was emerging from the Japanese scene – Mega Man, Link, Samus Aran, Alex Kidd, Bonk and arguably the most popular gaming character, Mario. "We knew him as Jump Man from Donkey Kong (or



» [Arcade] Plenty of Eighties heroes gained fame across genres – Bub and Bob hit the puzzle scene later on.



» [ZX Spectrum] All sorts of wacky heroes were fair game in the Eighties, like the popular duo Head and Heels.

HALL OF HEROES

A SELECTION OF THE MOST RECOGNISABLE GAMING HEROES OF THE EIGHTIES – AND WHAT THEY'RE UP TO NOW

PAC-MAN • 1980

▶ This hungry yellow chap was an arcade phenomenon in the Eighties, despite being designed so that you couldn't discern his emotions. It didn't matter – he ended up starring in many sequels and a cartoon series as well as adorning all sorts of merchandise, both in the Eighties and far, far beyond.

MARIO • 1981

▶ While *Donkey Kong* was named after its starring villain, the unassuming plumber that battled him soon became a bigger star thanks to a series of incredible platform games. As the most recognised of Nintendo's many famous characters, he'll surely be around for decades to come, too.

MINER WILLY • 1983

▶ What type of character could be more emblematic of Eighties Britain than a miner? His third proper outing never saw the light of day thanks to creator Matthew Smith's difficulties in finishing the game, curtailing his career, but we'll always have the excellent *Manic Miner* and *Jet Set Willy*.

SABRE MAN • 1984

▶ Ultimate's hero was one of the few characters to undergo development between games – as well as changing gameplay styles between *Sabre Wulf*, *Underwurlde* and *Knight Lore*, he actually become a werewolf at one point. *Sabre Wulf* saw a 2004 remake, but he's been inactive since.

» [Arcade] Billy and Jimmy Lee prove that siblings were popular choices whenever a second player got into the mix.

Killer Gorilla on BBC) as we didn't see *Super Mario Bros* until late 1989 when we went to America," says Philip, providing a reminder of how gaming scenes were so much more regionally distinct at the time.

Of course, as we grew up, our tastes shifted and big hits today tend to star realistic human characters. "Many games these days are trying to appeal to 15-plus-year-olds who generally prefer more mature characters and realistic environments," says Philip, explaining the decline of the Eighties-style cartoon hero. "But new characters are still being introduced, targeted at kids, take for example the Angry Birds which even led to two movies. Then there's Steve and Alex from *Minecraft*, although since their names are less unique they are less memorable. More recently you have Goose, from the *Untitled Goose Game* – they really needed to work on their marketing names!" ▶

» Some characters had relatively low-key debuts – Solid Snake only became a true superstar in the Nineties.

KING OF THE JUNGLE

DAVID CRANE TALKS ABOUT THE CREATION OF ONE OF GAMING'S FIRST HUMAN HEROES, PITFALL HARRY

What made you create Pitfall Harry?
Pitfall! came about primarily from my desire to make a game with a human main character. At the time, most game characters were inanimate objects – tanks, space ships, etc. I animated the character and placed him in a jungle setting, and it worked very well.

Do you think giving your character a name and personality helped players bond with him?
Pitfall! was one of the first times that you would control a human-like character in a videogame as your avatar. As my alter ego, it was natural to name him. I made him do all the fun things that I would have enjoyed – from swinging on vines to hunting for treasure. Frankly, he didn't exactly have a 'personality', but the game-player could identify with him as they risked the hazards of the game together. If a player bonded with him, it would likely have been because you were risking your lives together.

Why do you think so many videogame characters started appearing during the Eighties?
Videogame technology went through a rapid growth in the Eighties, allowing more detailed animations to be created. Controlling an on-screen avatar was clearly enjoyable (whether it was a jungle adventurer or a plumber), so it was only natural to use that newfound animation capability to make increasingly complex characters. I think that led to the ability to imbue characters with personality as well.

Did you have much involvement with Harry's appearance in *Saturday Supercade*?
I offered to be Pitfall Harry's voice, trying out sort of a Dudley Do-Right characterisation. But I was never taken seriously since I was needed in the lab making games.

What things should you keep in consideration as a developer when creating a videogame character?
Character development is an important aspect of mainstream media, but it wasn't much of a factor in the Eighties. We first figured out how a character would act in the context of a game; then figured out his 'look' given the available technology. What authors refer to as 'character development' took a distant third. These days, on the other hand, with videogames rivalling films in complexity and interaction, game characters deserve every bit as much breadth as characters in other media.

Why do you think Pitfall Harry remains so loved by gamers?
Pitfall! was a huge success during the rise of videogames. Virtually every game-player at the time either owned the game or played it at a friend's house. It was also visually stunning for its day, so everybody who played it had fond memories (even if some found it hard to play). That was many people's 'golden era' of gaming, and *Pitfall!* was very much in the game-players' minds at the time. I suppose Pitfall Harry benefits to this day from the nostalgic glow of those good old days.

» [Atari 2600] David says while Pitfall Harry didn't have a personality, gamers bonded with him as you were taking on deadly situations together.

MY FAVOURITE LOADING SCREENS

URIDIUM BY STEPHEN CROW
ZX SPECTRUM 1986

"I loved the ship. Coming out of the screen at an angle, it looked like a solid object I could reach out and pick up off the screen. Simple but effective rendering of the title, too."

WONDER BOY • 1986

▶ This hero has had a variety of odd names, much like his own series, and turned from an axe-chucking skateboarder into a shapeshifting swordsman. It seemed like his glory years were long behind him until recently, when a surge of new activity gave him a welcome career renaissance.

ALEX KIDD • 1986

▶ Sega's hero was a little kid with a huge fist and a love of rock-paper-scissors. Though he starred in some cracking games, ropey outings like *The Enchanted Castle* and *Hi-Tech World* meant he never gained a reputation for consistency before he was sidelined by a blue show-off in the Nineties.

DIZZY • 1987

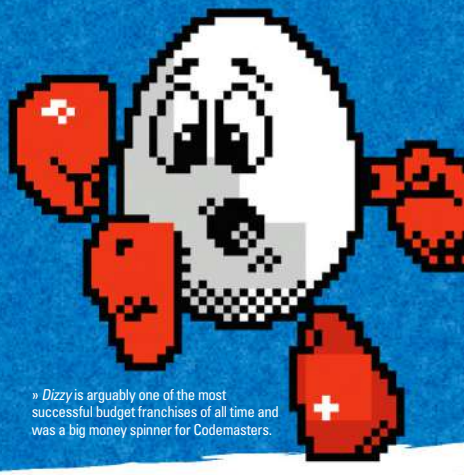
▶ The prince of the Yolkfolk was a smash hit on the home computer scene, doing the business for Codemasters across a series of arcade adventures. He'd later star in plenty of spin-offs and even make a move to consoles, but his career stalled in the mid-Nineties and he never moved to 3D.

MEGA MAN • 1987

▶ Capcom's most prolific character has starred in an enormous number of games, selling over 36 million copies, and enjoys great popularity amongst nostalgic NES owners. He's slowed down in recent years, but his retro-style outings since 2008 have been consistently popular with players.

BUDGET BRILLIANCE

WHILE GAMES WERE FAR CHEAPER IN THE EIGHTIES COMPARED TO TODAY, NOT EVERYONE HAD A SPARE TENNER TO SPLASH OUT ON THE LATEST TENT-POLE RELEASE. FORTUNATELY, BUDGET GAMES AND COMPILATIONS WERE A GREAT WAY TO ENSURE YOUR HARD-EARNED POCKET MONEY STRETCHED AS FAR AS POSSIBLE



» *Dizzy* is arguably one of the most successful budget franchises of all time and was a big money spinner for Codemasters.

Even if you make adjustments for inflation, games were still cheaper to buy during the mid-Eighties than they are today. £9.99 seemed to be the sweet spot for many publishers releasing games during this period and not everyone could justify them, meaning those more coveted releases would typically end up going on Christmas and birthday lists. Fortunately, there were plenty of ways to get your hands on cheap games without resorting to type-in listings, piracy or mail-order clubs. Those alternative options were budget games and compilations, and our pockets will be forever grateful for them. "For me, it was all about the cost," explains Simon Plumbe, the founder of Facebook's Mastertronic Collectors Group. "I didn't get a lot of pocket money growing up so it meant that I could still get a new game every week."

When you think of budget games today, Codemasters and Mastertronic are typically the first you think of. Both companies did exceptionally well at selling games at lower price points, and Codemasters is still going strong today – although its founders, Richard and David Darling, have long since left. While lower-priced games certainly existed before Mastertronic appeared, it arguably helped shape what would become a very profitable part of the industry in the Eighties and early Nineties. Mastertronic first started selling £1.99 games in April 1984 and shifted over 40,000 units after a week on sale. A combination of enticing artwork, recognisable branding and targeting various home systems worked wonders for the company and led to countless other publishers following suit. "Atlantis really helped keep the VIC-20 going when others moved away from it, so I bought a lot of their games," continues Simon.

» You were unlikely to be disappointed if you received an Ocean compilation like *The Magnificent 7*.

"And I can't forget Firebird and Codemasters for delivering plenty of top-quality titles as well."

Plenty of other publishers jumped on board the budget train and the cannier ones even set up specific labels like The Hit Squad (Ocean Software) and Kixx (US Gold) as a way of giving older games a second bite of the cherry. Simon remembers these re-releases fondly. "We might complain about game prices now but as a kid in the Eighties even £10 for a new game was a lot so re-releases were fantastic," he explains. "There was no way we could afford everything, so getting a slightly older game cheap was great." Low prices also seemed to help stave off piracy too, with Simon recalling it being less prevalent. "It did happen sadly, but it didn't seem to stop kids from buying them, either," he recalls. "The price still made them appealing enough and I remember that I could

» Compilations were a great way of stretching your pennies when money was tight.

» Companies like Mastertronic used bright, distinctive branding to instantly stand out on shelves.

» Simon Plumbe loved collecting Mastertronic games so much he set up a popular collector's group.

MY FAVOURITE LOADING SCREENS

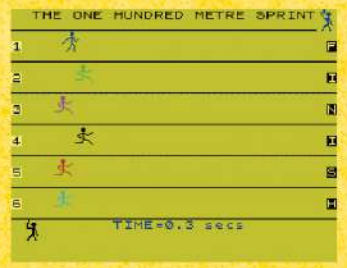
KNIGHT LORE BY TIM STAMPER
ZX SPECTRUM, 1984

"The very first Ultimate loading screen that didn't use the game's artwork as a reference, a totally unique illustration not seen anywhere else. It only added to the mystique of the game. Excellent attribute work, and I loved the detailed skulls hanging off the Wizard's belt."

» [C64] Titles like *Knight Tyme* were a big success for Mastertronic and proved a small outlay didn't mean a weak game.

» [C64] Lower prices meant publishers could take risks. It's very unlikely *Pub Trivia* would have survived with a £10 price tag, for example.

» [C64] After releasing games for Mastertronic, the Darling brothers set up Codemasters and published *BMX Simulator.*



» [ZX Spectrum] While *Cassette 50* offered 50 games for £9.99 the actual selection wasn't the best.

» [ZX Spectrum] Titles like *Booty* were a great success for Telecomsoft's Firebird label.

always find large piles of budget games at all my friends' homes!"

Of course, budget games weren't the only way to enjoy gaming on the cheap in the Eighties; another popular way was to save your money and put it towards the many compilations that publishers released. Sure, some of the earlier examples like Cascade's *Cassette 50* were filled with pretty terrible games, but as the market matured, more and more publishers put larger effort into them, enticing gamers with a selection of hit games that they might not have otherwise been able to afford. Both budget publishers and full-price publishers saw the strength of being able to resell you games, leading to a range of compilations like *They Sold A Million, The Magnificent Seven, The Gold Collection* and the many different collections created by Beau Jolly to name just a few.

As great as these compilations proved to be for us, they could certainly provide problems behind the scenes. Simon Berry was a technician at Speedlock and would add protection to various games and subsequently compilations. "Since the compilation typically came out a couple of years after the original, occasionally there were compatibility issues across the ever-increasing variety of Spectrum hardware (Amstrad was pretty stable) to think about, although these tended to get identified during QA," he reveals. "Disks were particularly expensive. So then it became the challenge of how many games could fit on one side of a disk. I invented a novel disk format, and used data compression with this to jam as much as I knew how onto disks."

Those endeavours were tricky but worth it, as they created essential revenue streams for publishers and became a valid way of acquiring a great library of games without spending an absolute fortune in the process. Budget games and compilations became an important aspect of the games industry during this period, and it's somewhat sad that they're nowhere near as prevalent today. ▶

MASTERING THE BUDGET

MASTERTRONIC'S PR ALISON BEASLEY

Why were companies like Mastertronic so successful?
Mastertronic were smart in selling packs or bundles of titles, together with the option of a rack or stand so that retailers could make an easy choice of a pack that came with 'x' number of games and an easy way to display them. Alongside the major retailer chains (Boots, WHSmith, Woolworths etc) they were very smart about selling into petrol stations; corner shops and a bunch of other outlets where people would make impulse purchases. The founders had a lot of retail experience, in selling videos (porn!) so really understood production, distribution and retail. They had a network of sales reps who covered various areas and retailers who played a vital role.

Did the low price point help against piracy?
Not much. There were big issues with piracy at markets and retail all over Europe. There were busts and seizures but it was a constant menace. Our team of reps were constantly on the lookout and didn't hesitate to take pirated stock.

Mastertronic had a lot of sub-labels, was it important to keep the brand fresh?
Yes, they were always looking at ways to keep the range exciting for retailers and consumers. The MAD range, priced at £2.99 also meant they had a better margin and a bigger budget to put into development. Development skills and consumer expectations were moving quickly, so we were keen to keep pace and stay ahead.

How important were review scores?
A good score was stickered onto the game's packaging and featured in ads, which was definitely useful for consumers. Our games sat alongside higher-priced games in major outlets, so anything that made them stand out and look like a better choice was always helpful. Reviews became increasingly important to the point where distributors demanded to know what kind of review scores we expected or had gained, before they'd place an order.

THE HIT SQUAD

PAUL HUGHES ON ASSEMBLING OCEAN'S COMPILATIONS

Why were compilations important to companies like Ocean?
I guess, put simply: money! The return on investment was pretty high. For the consumer it was great value for money, for the publisher it was reasonably simple to put together for little outlay.

What did working on a compilation entail?
This wildly varied depending on where the titles originated from and the media they appeared on. If the titles were internal, chances are I'd already mastered them and so had either the raw unprotected code, or the master maker already to hand. It generally started though with Lorraine (the assistant software manager) coming over with the names of the games that were to appear on the title and from there I'd have to work things such as the optimal order (which sides) to put the games on in order to keep the tape length as short as possible (less tape equalled less cost). The same applied to the disk versions.

Were there difficulties creating them?
With externally licensed titles, if I was lucky I'd get a master maker to just hand off to the duplicators. In some cases, I'd get a disk of raw code to wrap up with a fast loader and the various protection trickery. In a surprising amount of cases, I just got a cassette of the game and had to break into the protection, inject our own load routines in and then remaster the title again.

Did you license games from other companies?
Oh yes, there were many deals done with Activision over the years – games such as *Ghostbusters 2, The Last Ninja, Karnov, Predator, Rampage, IK+* all featured on Ocean compilations.

If a developer's game appeared on a compilation after it had already been released were they paid again?
If it was a title developed internally, or an Ocean licensed conversion done out of house, generally not. Internal developers were salaried and paid discretionary bonuses, so there were no royalties at the time. External developers generally got a one-time fee so weren't due anything for compilations.

What's the best compilation you worked on and why?
Gosh! There were a lot of them! *The Magnificent Seven* was a pretty good one from what I recall, especially because it contained eight titles! All of the titles were developed by Ocean/Imagine so I'd imagine it was a very tidy little earner for them.

TREMENDOUS TUNES

THE EIGHTIES WAS THE ERA WHERE VIDEOGAME MUSIC TURNED FROM SOUND EFFECTS AND SHORT JINGLES TO AN ARTISTIC SPECIALISM IN ITS OWN RIGHT, ALLOWING FOR A GOLDEN AGE OF EXPERIMENTATION

Though the games of the Seventies certainly had their distinctive sounds, from the bassy boom of *Asteroids*' explosions to the relentless march of the *Space Invaders*, gaming audio really came of age in the Eighties. One man noted for his love of game music from this era is Chris Abbott, owner of C64Audio.com. While he's most associated with the SID, his love of game music actually predates his ownership of Commodore's most popular machine. "The Atari 400 was my first machine, so I have a really soft spot for POKEY, which was a chip they put a lot of thought into. Hearing *Preppie!* and *Shamus* for the first time on the winter's night I got my first computer was life-changing." Once he got the C64, he discovered the work of a range of talented composers, including Rob Hubbard, Martin Galway, Ben Daglish, Maniacs Of Noise and Tim Follin. While those composers made their names here, in Japan the likes of Koji Kondo, Yuzo Koshiro, Hiroshi Kawaguchi, Shinji Hosoe and Nobuo Uematsu began their own careers, creating memorable tunes in the arcades and on home consoles.

Of course, while the musicians were names you came to know, their tools were just as important and the decade saw rapid technological development. "Going from the VIC-20's synth chip to the wonder of the C64's SID was a huge leap, but going from 'essentially beepers' to Atari's four-voice POKEY chip was almost as big a jump. The guys behind the SID went on to Ensoniq to do amazing stuff with wavetables that seemed to go nowhere commercially. They were years ahead of their time." FM synthesis became popular in arcades from the mid-Eighties and eventually filtered into the home in systems like the Amiga and Mega Drive. By the end of the Eighties, it was even possible to experience games with CD audio, if you were lucky enough to own a PC Engine with the appropriate add-on. Freed from restrictions, composers were able to reimagine the chiptunes of games like *Ys* and *Wonder Boy III: Monster Lair*.

Today, Eighties game music is reimagined in a similar way by composers in projects like OCRemix and Chris' C64Audio.com. When asked what keeps people interested in his own project, Chris notes a few factors. "Partly because they're full of talented people including original composers like Rob Hubbard, and because they feel part of that community: it's a bit of a family," he explains. "Partly because people like 'the same but different' and to have tunes they love have more love poured in. And partly because the projects are so ambitious, technically and creatively: who else would risk a multi-decade project to get a whole symphonic orchestra to do C64 tunes? And we deliver. Eventually!"

» By the end of the Eighties, Japanese gamers could buy official CD releases of their favourite soundtracks.

» [Arcade] Developments like FM synthesis chips were initially restricted to expensive arcade hardware, before going mainstream.

» [C64] Some games shared loading themes, like the excellent one accompanying *Rastan* and other Imagine Software games.

MAGNIFICENT MAGAZINES

WITH NO INTERNET AND LIMITED TV TIME FOR GAMES, THE ONLY WAY TO GET INFORMATION ABOUT NEW RELEASES WAS THROUGH THE MAGIC OF THE PRINTED PAGE

While plenty of column inches had been dedicated to the success of Atari and *Space Invaders* during the Seventies, the Eighties marked the first time that we got publications wholly dedicated to electronic games. *Computer & Video Games* opened the floodgates in the UK with its debut November 1981 issue, and by the mid-Eighties we had a formidable range of magazines delivering all the information gamers craved.

One reader who remembers those days well is Vinny Mainolfi, who was introduced to games magazines through issues of *C&VG* and *Personal Computer World* that came with his first computer. For him, the appeal of the magazines was one very distinctly tied to the Eighties. "Both magazines were a great source for game listings that I could type into my good old TRS-80 – bless it. I was more excited about the game listings than the actual game reviews." With the early home computer market being so competitive, those multiformat magazines were key to begin with. But as market leaders emerged, so too did single-format magazines. "I treated myself to a brand-new Commodore 64 and totally fell in love with *Zzap!64* – mainly the Julian Rignall years. Seeing the game reviews such as *Way Of The Exploding Fist* and *Ghosts 'N Goblins* just blew me away. It was a different style of magazine that really fitted the times and vibes that we were all experiencing during our teenage years – the hair; the clothes; the music..."

While the format of news, reviews, tips and screenshots would define gaming coverage for years to come, the graphical limitations of the era meant that creativity was needed for memorable covers, with artists like Oli Frey providing memorable illustrations. "Many of the early covers of *Zzap!64* hold a specific memory for me: when I purchased them, what the weather was like at the time; how happy/unhappy I was; what music I was listening to," says Vinny. "Those covers were *that* powerful that they evoke so much feeling and memories." Also hand-drawn were the portraits of the magazines' writers, who felt like people you could connect to. "It's what we craved: our very own rock stars of the gaming industry; and it's something we needed to help boost our confidence about playing computer games – we were no longer spotty, greasy-haired, BO-stinking geeky teenagers," says Vinny. "The personalities helped to raise the profile of the gaming industry as a whole."

Fondness for the magazines of the time led Vinny to create *FREEZE64*, a dedicated Commodore 64 magazine. "Many of our readers have said that receiving and reading *FREEZE64* is like having *Zzap!64* again. This is probably the highest compliment I could ever receive," he says. "But my intention is to avoid copying any style that *Zzap!64* had back in the day. What I do try and mimic is the feeling and anticipation of waiting for the next issue, and then receiving it. That excitement and build-up is one of my favourite experiences of magazines from back in the Eighties." ▶

MEMORABLE MELODIES

FIVE CLASSIC TUNES THAT BRING THE NOSTALGIA FLOODING BACK

MONTY ON THE RUN

TUNE
Main Theme

COMPOSER
Rob Hubbard

▶ There are any number of games you could have chosen to represent Rob Hubbard's work, but we particularly like the frenzied accompaniment to Monty Mole's third outing. The lengthy piece incorporates a number of amazing sections, including a memorable 'guitar' solo in the middle.

THE LEGEND OF ZELDA

TUNE
Overworld Theme

COMPOSER
Koji Kondo

▶ This jaunty little theme definitely feels like the right fit for a game that plunges you straight into the deep end of an adventure, with nothing but some weaponry and your wits to protect you. Though the tune lasts just 40 seconds before looping, it remains the basis for the series' music to this day.

OUT RUN

TUNE
Magical Sound Shower

COMPOSER
Hiroshi Kawaguchi

▶ At a time when music was still a luxury in many games, Kawaguchi's access to arcade hardware allowed him to do pioneering work with FM synthesis and even add a choice of soundtracks. When we daydream of sunny shores lined with palm trees, this is our musical accompaniment.

DRACONUS

TUNE
Title theme

COMPOSER
Adam Gilmore

▶ Time and talent can do great things, and by the late Eighties Adam Gilmore had really learned to wrestle the best from the Atari 8-bit's POKEY chip. The title theme for *Draconus* really made the old hardware sing, and set the tone for the game – which it had to, since there was no in-game music.

HEMON Z: MEGABLAST

TUNE
Main Theme

COMPOSER
Bomb The Bass/David Whittaker

▶ Adapting the track *Megablast* (Hip Hop On Precinct 13) was a stroke of genius for the always trendy Bitmap Brothers. As well as being one of the earliest signs of the licensed music boom that would happen in the Nineties, it was something that demonstrated the power of the 16-bit machines.

MY FAVOURITE LOADING SCREENS

STARSTRIKE II BY GRUM
ZX SPECTRUM, 1986

"A highly detailed and expertly rendered digital version of the game's cover art. The amount of detail in it used to give me a headache, and I wished I could draw something as good as this on my own Spectrum."

RECOMMENDED READING

THE MAGAZINES THAT DISTINGUISHED THEMSELVES FROM THE PACK

COMPUTER & VIDEO GAMES

LAUNCH YEAR
1981

▶ The first name in UK videogames magazines didn't just succeed by being the first magazine to market. As the decade went on the magazine kept itself relevant by adapting its format, with a bigger focus on reviews as the years went on, and eventually creating demand for consoles with import coverage.

CRASH

LAUNCH YEAR
1984

▶ Newsfield's first big success in games magazines was driven by its youthful staff, who shared the readership's enthusiasm for the games they were covering. The magazine's team was keen to use real screenshots and positioned it as a buyer's guide, focusing on reviews and tips over type-ins.

ZZAP!64

LAUNCH YEAR
1985

▶ Realising that Commodore gamers would probably enjoy a magazine with a similar approach to *Crash*, Newsfield launched this sister title. Writers such as Gary Penn and Julian Rignall soon became familiar names to the magazine's readers, and regularly beat them in gaming challenges.

AMSTRAD ACTION

LAUNCH YEAR
1985

▶ Yes, we're choosing a Future title here – but let's be honest, there's a reason that it ran for ages. If you had Alan Sugar's machine, this was the right title to go for, especially when the Christmas issue included a cover tape. Later on, those tapes would became staple of the computer magazine market.

ACE

LAUNCH YEAR
1987

▶ This multiformat magazine was trying to be a bit different from the competition, with a broader outlook on computer entertainment and a tone that aimed at an older teen audience. For some reason, it scored games out of 1,000 rather than the more common scales, which we always liked.

LICENCE TO THRILL

IN THE EIGHTIES, THE LICENCE WAS KING. GAMERS WERE OBSESSED WITH PLAYING THE LATEST ARCADE GAMES IN THE COMFORT OF THEIR HOMES, WHILE LICENCES BASED ON MOVIE AND TV SHOWS WOULD DOMINATE THE CHARTS. GARY BRACEY EXPLAINS WHY THEY WERE SO POPULAR

Licences really began to come of age in the Eighties and publishers would fight over themselves to earn the rights to convert the most popular arcade games, films and TV shows. One company that excelled at this was Ocean Software. Many developers would base their games on arcade classics including Jon Ritman, Geoff Crammond and Jeff Minter, and Ocean was no exception. "Before we became 'Ocean', we were 'Spectrum Games' and doing rip-offs of classic arcade titles," explains Gary Bracey who worked at Ocean as its software director. "Then the opportunity to license the official *Hunchback* coin-op was presented to Jon Woods and that was the start (a little before I joined the company). That was the first licensed Ocean game, and we soon realised that a recognisable brand was a great marketing hook so Jon focused his early energies on the acquisition of such licences."

One of the early benefits of acquiring arcade games was that the cost of the licence was relatively cheap. It led to a number of conversions appearing under both the Ocean label and its acquired Imagine Software label. "Jon stayed very much at the forefront of that, having established great relationships with the likes of Konami and Taito in Japan," Gary continues. "In the early days, we were given carte blanche to adapt whichever of their games we wanted, but not long after the massive success of the NES, those companies realised they could make much more money by doing it themselves and so it became a lot more challenging to get the high-profile coin-op rights."

Interestingly, while Ocean had success with the likes of *Hunchback* its early TV and film adaptations didn't find the same critical success and we're keen to know why. "Errr… because they were shit?" says Gary. "The problem was that in the early days, Ocean had a very small in-house dev team and had to 'farm out' much of its development to external freelancers," he continues. "There was little-to-no oversight of these developments and so those external studios weren't motivated to do much. This resulted in very poor quality products… if they even materialised at all. This was one of the reasons I was brought in – to basically oversee and manage the development (both in-house and external), because there was no one doing it!"

Gary's introduction saw a rise in overall quality across the publisher's output, and while Ocean still produced some stinkers during his tenure (the C64 version of *Chase HQ* and *Miami Vice* immediately spring to mind) there's no denying it released some of the best licences of the time. Of course, it wasn't just Ocean that saw the merits of licensing coin-ops and films, and plenty of

MY FAVOURITE LOADING SCREENS

FAIRLIGHT BY JACK WILKES
AMSTRAD CPC 1985
"I love the atmosphere portrayed here. A beautiful sunny day looking out the window of your castle at the boat out on the lake. A friendly rook visits in the hope for a few scraps of food. Also, it actually helps you with the game and gives you to a clue to the location of a hidden room."

» Ocean's *Platoon* and *RoboCop* featured different gameplay mechanics to suit specific scenes from the movie.

A LICENCE TO PRINT CASH

GARY BRACEY'S STEPS TO 80S LICENSING SUCCESS

1 "AIM FOR A CHRISTMAS RELEASE, WHICH WAS THE PEAK SELLING PERIOD OF THE YEAR"

2 "SELECT A HIGH-PROFILE LICENCE. ONE THAT'S IDEALLY RECOGNISED BY 90% OF PEOPLE"

3 "MAKE SURE YOUR CHOSEN LICENCE IS A VERY CURRENT ONE. THIS IS IMPORTANT FOR OBVIOUS REASONS"

» [NES] The *Teenage Mutant Ninja Turtles* NES pack achieve the same success for the NES that Ocean's *Batman* managed for the Amiga.

» [C64] Audiogenic's *Emlyn Hughes International Soccer* married a popular celebrity to a mechanically great football game.

other developers were eager for a slice of the pie. Activision tackled various movies and coin-ops, including many by Sega. If you enjoyed Capcom games, odds are a home version would be published by US Gold, while the likes of Alternative Software and Hi-Tech Software specialised in TV and cartoon licences. Elite dabbled in both ponds, delivering arcade conversions of *Commando* and *Paperboy* and tackling things as diverse as *Frank Bruno's Boxing* and *Mike Read's Pop Quiz*. Firebird produced the likes of *Bubble Bobble*, *Flying Shark* and *Mr Heli*, while Mastertronic used a Skips tie-in to flog *Action Biker* on various 8-bit systems. Chances are, if something was popular on the TV, silver screen or even the lunch canteen, a publisher would find a way to capitalise on it.

One of the reasons licensed games were so popular with publishers in the first place was due to the low cost of acquiring them, although that did change. "They were really very cheap," admits Gary. "Movie companies just saw it as incremental revenue – not a big earner – and so we were able to acquire them relatively cheaply. *RoboCop* changed all that and was the game that made Hollywood realise that they could generate meaningful income from videogame licensing. That was the last 'cheap' licence – I think we paid around $20,000 for all digital rights – all computer platforms, all console platforms, coin-op and pinball!"

RoboCop is worth highlighting, as along with the earlier *Platoon* it popularised an approach Ocean often took with its film licences, cleverly cutting the games into minigames to capture key elements of the movie. "Simon Butler was definitely a key contributor to the concept, as I think the first successful iteration was *Platoon*," Gary recalls, admitting it was a team effort. "I remember we needed to read the script and pick out key scenes which we thought might translate well interactively. *Platoon* had a number of such scenes but for different action scenarios and so the brainstorm session resulted in, 'Well, why don't we do all of them, rather than just picking one?' Of course, this meant significantly more development work (and therefore time) as we were making several games in one. But the formula was a good one and worked in such titles as *RoboCop* and *The Untouchables*."

That formula worked well for Ocean, and it continued to have success with numerous licences well into the late Nineties until it was eventually purchased by Infogrames in 1996. Games based on films and TV remained popular with gamers, only really slowing down with the current generation of systems. Nowadays, titles like PlayStation's *Spider-Man* are the exception rather than the norm and news of a newly licensed game typically fill us with dread. In the Eighties however, licences were celebrated, mainly because they allowed us a way to enjoy our favourite movies, TV shows and arcade games on the home systems we loved. ✱

4 "MOST IMPORTANTLY – THE FEATURED GAME HAS TO BE GREAT, SO IT NEEDS TO BE WELL-REVIEWED."

5 "IF POSSIBLE, BUNDLE THE GAME WITH ONE OF THE HARDWARE FORMATS AS IT GETS MORE IN-STORE AND IN-PRESS PRESENCE"

DIGITAL BLOCKBUSTERS

YOU WON'T FIND ANY CASH GRABS HERE

STAR WARS: THE EMPIRE STRIKES BACK

YEAR
1982

PUBLISHER
Parker Brothers

▶ The *Star Wars* licence got off to a great start with this frantic blaster from Parker Brothers. While it admittedly shares many elements with Eugene Jarvis' *Defender*, it manages to up the ante by tasking the player with taking out gargantuan AT-AT Walkers before they can destroy Echo Base's power generator.

GHOSTBUSTERS

YEAR
1984

PUBLISHER
Activision

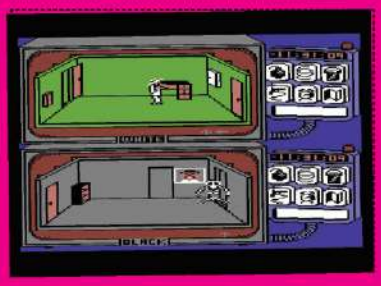
▶ The huge success of the *Ghostbusters* movie meant a film tie-in was inevitable. Activision dutifully delivered and David Crane proved that busting ghosts yourself was just as fun as watching the critters get wrangled on the silver screen. It's notable for having largely great ports and being one of the earliest film licences to seemingly appear on everything.

SPY VS SPY

YEAR
1984

PUBLISHER
First Star Software

▶ A good videogame licence is one that effortlessly manages to capture the spirit of its source material and the early *Spy Vs Spy* games manage that brilliantly. It's best played with a friend as you each play one of the famous rival spies as you seek out items you need and lay fiendish traps for your opponent.

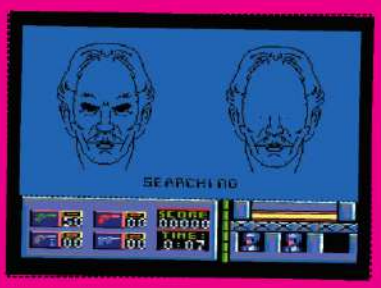


ROBOCOP

YEAR
1988

PUBLISHER
Ocean Software

▶ While *RoboCop* wasn't the first Ocean game to break down key elements of a film into neat bite-sized gaming chunks, it's certainly the one that perfected the formula. The core run-and-gun levels are interspaced by some excellent minigames that range from an identikit match-'em-up to saving a woman from an assailant. Additionally, all the available versions are great fun, too.



OPERATION WOLF

YEAR
1988

PUBLISHER
Ocean Software

▶ There are a whole host of great arcade conversions to cover, but this wonderful effort from Ocean is one of our favourites because no home version was a duffer. The 16-bit offerings are extremely accurate to the arcade original, but even the 8-bit ones are great fun. The non-Ocean console ports are good, too.

THE 80s

A DECADE OF INCREDIBLE GAMES

THE EIGHTIES WAS A TUMULTUOUS DECADE OF TECHNOLOGICAL TRIUMPHS AND PIONEERING CONCEPTS, AND AS A RESULT IT IS PERHAPS THE MOST-INTERESTING TEN YEARS IN GAMING HISTORY. JOIN US AS WE REMINISCE ABOUT THE REMARKABLE GAMES THAT WERE PRODUCED IN THIS GOLDEN ERA

WORDS BY NICK THORPE AND DARRAN JONES

If there is one thing that you can't accuse Retro Gamer of, it is wallowing in nostalgia. Oh, *alright then* – we're not exactly Luddites around here but as we're sure you will all know, we are sometimes partial to expressing the notion that, just maybe, 'They don't make them like they used to.' But when it comes to the Eighties, doesn't that actually seem like a fair thing to say?

We're not just waving the retro flag for the sake of it, gaming really was different back then. For a start, there was the rapid pace of technological change. We went from monochrome machines with a single kilobyte of memory at the start of the decade, to the growing acceptance of polygon-pushing powerhouses in arcades at the end. Anyone gaming ten years ago could probably have imagined the games of today, but there was no chance that anyone growing up on *Pac-Man* could have realistically expected the likes of *Out Run* by the middle of the decade, let alone *Populous* at the end.

The level of professionalism was different too, as creatives and business folk alike tried to work out how to handle an emerging industry. While the indie spirit has returned to gaming in modern times, it's sobering to remember that as the business grew during the Nineties and beyond, we spent a long time with risk-averse publishers who wouldn't have touched something like *Skool Daze* or any of Llamasoft's more unusual fare. Nobody in the first half of the decade could have foreseen the attempts by Nintendo and other console manufacturers to restrict what content gamers were exposed to.

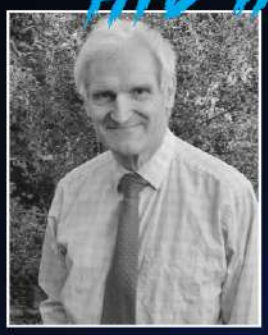
Of course, everything was also filtered through the lens of Eighties pop culture and current events. The Cold War was still at the forefront of people's minds, gory horror was in vogue as the video nasties made their way into our homes, and plenty of blockbuster movies made their mark too. There was even a little bit of political commentary at play, as the likes of *Wanted: Monty Mole* will prove.

But for all the technological, market and cultural forces at work, it was the games that made the decade so exciting to live through, and in this feature, we'll be charting the course of the decade year by year with the focus on the software. Along the way, we'll examine the trends that swept the industry, as well as picking out the key games that shaped and reshaped our understanding of what our still-young hobby could offer us. So sit back, grab some Space Raiders and your fizzy drink of choice, and join us for a look back at a time when gaming really was different. ▶

» [ZX Spectrum] Matthew Smith's *Jet Set Willy* made its way into many bedrooms during the Eighties.

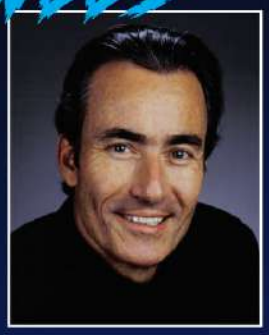
THE INTERVIEWEES

VAN BURNHAM
Author, *Supercade: A Visual History Of The Videogame Age*



MALCOLM EVANS
Programmer, *3D Monster Maze, 3D Tunnel* and more

DAVID CRANE
Cofounder, Activision. Programmer, *Kaboom!, Ghostbusters* and more



TRIP HAWKINS
Founder, Electronic Arts. Founder, The 3DO Company. Entrepreneur

CHRIS WILD
Programmer, *The Lords Of Midnight* remakes, *Cyberwar* and more

EUGENE JARVIS
Programmer, *Defender, Robotron: 2084* and more

PHILIP OLIVER
Programmer, *Dizzy, Super Robin Hood* and more

TONY TAKOUSHI
Games journalist, *CVG, Big K* and more

JIM BAGLEY
Programmer, *Defender* (Game Boy), *Gutz* and more

DEFINING GAMES

ADVENTURE

DEVELOPER: ATARI INC

When Warren Robinett sent players on a quest to recover a magical chalice from dangerous dragons, he unknowingly created the DNA that would seep into all later action-based adventure games.

PAC-MAN

DEVELOPER: NAMCO

Clever programming of *Pac-Man*'s ghost antagonists and compulsive play mechanics turned it into a world-wide smash. Pac-Man is arguably gaming's first recognisable icon, and he is still going strong today.

MISSILE COMMAND

DEVELOPER: ATARI INC

Dave Theurer's shooter may have been fuelled by Cold War nightmares, but it delivered intense blasting thrills and highlighted just how useful a trackball was if you wanted lightning-fast gameplay.

SPACE INVADERS

DEVELOPER: ATARI INC

It might not have been that authentic to look at, but Atari's ambitious conversion of Taito's coin-op hit was arguably the first example of a triple-A console release and included loads of different game modes.

PHOENIX

DEVELOPER: TAITO

Blessed with multi-stage gameplay, huge swooping birds and chaotic action, *Phoenix* certainly left an impression on gamers. Its impressively huge boss, while not the first of its kind, remains equally memorable.

MYSTERY HOUSE

DEVELOPER: ON-LINE SYSTEMS

Text adventures were well-known to gamers by the late-Seventies, but Roberta Williams' horror-tinged classic added graphics to the mix and created a whole new genre when it appeared in 1980.

ROGUE

DEVELOPER: AI DESIGN

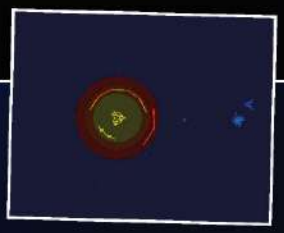
With its focus on exploring and permadeath being an ever-present threat, battling your way through *Rogue*'s hellish dungeons was equally thrilling and terrifying. The roguelike genre began here.

STAR RAIDERS

DEVELOPER: ATARI INC

Doug Neubauer's hectic space combat sim felt ahead of the curve when it debuted on Atari's 8-bit micros. It proves just how capable home computers could be in the right hands and delivered arcade-like thrills.

» [Arcade] Atari's *Battlezone* typified the militaristic themes of many games of its era.



» [Arcade] *Star Castle* was rather more abstract in its presentation of a shooting game.

1980

To say that 1980 was a time of transition would be an understatement, as the gaming world was still adjusting to proper colour displays, cartridge-based games, computers in affluent homes and the first Game & Watches. One particular innovation that kicked the decade off with a bang was characters, with Pac-Man and his ghostly pursuers making big waves simply for being something different to a car, tank or spaceship.

Elsewhere, Cold War paranoia still had a firm grip on the minds of many, as demonstrated by *Battlezone* – the vector tank combat game that was reworked into The Bradley Trainer for the US Army. *Armor Attack* was another vector game with a distinctive military theme. Those two could at least function as a power fantasy, which is more than could be said for *Missile Command*.

Fortunately, more fanciful fare could be found elsewhere in the arcades, with driving being a popular choice. Namco used vehicles as a vehicle (pardon the wordplay) for a new maze game in the form of *Rally-X*, which allowed players the proactive option of smoking out pursuing cars to defend themselves. Data East's *Highway Chase* also did something odd with cars, using them as the basis for a shoot-'em-up game that had more in common with *Space Invaders* than something like *Monaco GP*. *Star Castle* dropped all of that stuff and went abstract, though shooting was still the order of the day thanks to games like *Phoenix* and *Berzerk*.

In the home, Atari's 2600 version of *Space Invaders* wasn't just the first licensed arcade game ever, but the first game to sell over a million copies. Meanwhile, projects from the Seventies were going professional, as the text adventure *Zork* came off the mainframes and was given a full release as *Zork I* by the noted text adventure publisher Infocom. Graphic adventures such as *Mystery House* also started to appear courtesy of studios like On-Line Systems.

IAN BURNHAM ON PAC-MAN

"1980. It was a year that defined a paradigm shift that forever changed tech and pop culture. CNN, the Rubik's Cube, and – most importantly – *Pac-Man* debuted that year. Namco's oddly addictive maze game hit and hit hard, quickly positioning itself as the most-important game of the 20th century. Nobody was immune to its hypnotic blue haze as players of every age, gender and profession filled game rooms to maximum capacity. This era was an incalculable influence on me and still informs my work and career, leading me to write the original *Supercade* and inspiring myriad projects since."

» [Apple II] *Wizardry* pushed home-computer RPGs forward with party-based gameplay, and spawned seven sequels.

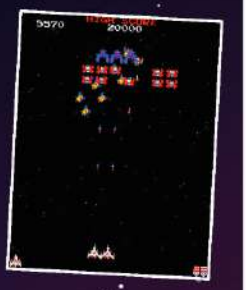
1981

The popularity of shoot-'em-ups showed no sign of fading in 1981, as the genre continued to evolve. *Defender* introduced bi-directional scrolling stages that responded to your movement, *Galaga*'s clever enemies could steal your ships, and the varied sections of *Gorf* and *Vanguard* also made their mark on the genre, as did Atari's *Centipede*. *Tempest* was a highly exciting new concept, too, helped by its colour vector graphics and unusual tunnel format. But arcade maze games were the hot new trend in the wake of *Pac-Man*'s success. The likes of *Mouse Trap* and *Lock 'N' Chase* allowed you to reconfigure the maze as a means of defending yourself, while *Crush Roller* added complexity with underpass and overpass sections.

Elsewhere in the world of coin-op games, Sega's *Turbo* raced to the front of the driving pack with detailed graphics and frequently changing scenery. SNK's *Fantasy* allowed players to continue after losing all of their lives, which was useful in allowing everyone to see its diverse range of challenges – for a price, of course. *Qix* tasked players with boxing-out areas of the screen, while *Donkey Kong* was a huge hit for Nintendo.

Atari 2600 owners were mostly happy to buy arcade conversions, and with games like *Asteroids* and *Missile Command* arriving at home that's understandable, but *Warlords* offered a four-player take on *Breakout* that became an instant classic. Activision's first really great games, the bomb-catching *Kaboom!* and the simple but excellent *Ice Hockey*, also hit the market this year. For cheaper home gaming, Grandstand's popular dedicated VFD shoot-'em-up *Astro Wars* was a must-have.

On the home computers, it was a great year for RPGs – as well as *Ultima*'s debut, Sir-Tech's *Wizardry* added some graphical sophistication to the genre and would go on to become highly influential in Japan. The arrival of more affordable computers like the Commodore VIC-20 and Sinclair ZX81 brought more systems into homes, with early hits including arcade clones like the *Pac-Man* clone *Jelly Monsters* and a cut-back rendition of *Frogger*. However, more original concepts like *3D Defender* and *3D Monster Maze* helped to show the potential of home-grown games. ▶



» [Arcade] It was a fiercely competitive year for shoot-'em-up developers, and Namco's *Galaga* certainly stood out.

MALCOLM EVANS ON EARLY COMPUTING

"It was a time for innovation. The ZX81 was born, inviting young minds to play basic games, and, from its manual learn the new language that gave their computer life. We stretched its capabilities to the limit. Even its crude graphics were no restraint to invention.

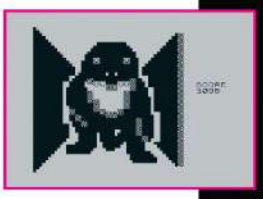
In bedrooms, ideas bubbled, spawning not only new games but genres of games, inspiring their virgin audience. It was a roller-coaster ride for many young and old boys' ambitions."

DEFINING GAMES

3D MONSTER MAZE

DEVELOPER: NEW GENERATION SOFTWARE

■ Cleverly coded by Malcolm Evans, this ZX81 hit stuck you in a maze with a ferocious T-rex and dared you to make it out in one piece. It proved that even carefully assembled ASCII characters could be scary.



DONKEY KONG

DEVELOPER: NINTENDO R&D1

■ Shigeru Miyamoto struck gold with *Donkey Kong*, delivering a brilliant platform game that made worldwide stars out of its protagonist and antagonist. It remains a huge hit with high-score players to this day.

ULTIMA

DEVELOPER: ORIGIN SYSTEMS

■ Richard Garriott's *Ultima* may seem crude by today's standards, but this engaging RPG offered a level of exploration and character development that few other games of the time could match.

SCRAMBLE

DEVELOPER: KONAMI

■ Konami's space shooter is notable for many reasons. It introduces forced-scrolling stages, variation within its continuous levels and requires you to bomb fuel tanks so you can continue your epic quest.

FROGGER

DEVELOPER: KONAMI

■ We'd argue *Frogger*'s success is due to its simplicity. Its distinctive theme meant it was instantly familiar to anyone, while its frantic nature made it impossible to just play once. It's still hopping around today.

CASTLE WOLFENSTEIN

DEVELOPER: MUSE SOFTWARE

■ *Castle Wolfenstein*'s World War II setting, clever exploration and subtle stealth elements mesmerised the likes of John Carmack and John Romero. *Doom* certainly wouldn't exist without it.

CENTIPEDE

DEVELOPER: ATARI INC

■ With countless shooting games set in space, punishing pastel-coloured insects in a garden felt fresh. Like *Mystery House*, Dona Bailey's green-fingered shooter is notable for spotlighting early women coders.

UTOPIA

DEVELOPER: MATTEL ELECTRONICS

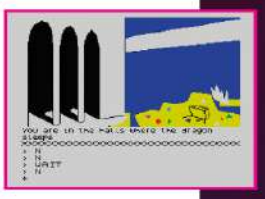
■ Don Daglow's inventive strategy gem arguably helped lay the groundwork for real-time strategy games and city-building games like *SimCity*, and proved that console games could offer plenty of depth.

DEFINING GAMES

THE HOBBIT

DEVELOPER: BEAM SOFTWARE

■ Text adventures had been popular long before *The Hobbit* was conceived, but its solid adaptation of Tolkien's work and its delightful visuals meant many developers soon copied its distinctive style.



PITFALL!

DEVELOPER: Activision

■ David Crane's inventive platformer was a smash-hit for Activision on the Atari 2600 and one of its best-selling games. Pitfall Harry's adventure formed the blueprints for an entire genre going forward, which isn't bad at all.

POLE POSITION

DEVELOPER: Namco

■ Racing games certainly weren't uncommon before *Pole Position* hit the arcades, but Namco's fast-paced game pushed the genre in exciting new directions. For many, the arcade racer started here.

ROBOTRON: 2084

DEVELOPER: Vid Kidz

■ Developers love Eugene Jarvis' twin-stick shooter and it's a favourite Desert Island Disks request. It's not an original concept, but it is an intense adrenaline-fuelled blaster that remains thrilling to play.

FOOTBALL MANAGER

DEVELOPER: Kevin Toms

■ When *Football Manager* appeared on home computers it set itself apart from its peers by prominently featuring its designer on the box and other advertising, as well as focusing on the management of your team.

XEVIOUS

DEVELOPER: Namco

■ Few shmups are as instrumental as Namco's blaster for establishing the vertically scrolling shooter. A rich backstory, interesting combat mechanics and continuously playing music all add to its significance.

MINER 2049ER

DEVELOPER: Big Five Software

■ Bill Hogue came up with *Miner 2049er* when single-screen platformers were rife. He made his game stand out by using multiple levels and letting you traverse each stage using different methods.

MICROSOFT FLIGHT SIMULATOR

DEVELOPER: Microsoft

■ Bruce Artwick built upon his early Apple II flight simulator and added enhanced visuals, weather variables, and much more, reinventing the newly evolving genre in the process.

» [Arcade] The cute enemies of *Dig Dug* ended up becoming minor mascots for Namco.

1982

This was the year that third-party publishers made a mark on the console world, with a glut of games flooding the market. There were some great ones to be found, too – Activision's contributions included Carol Shaw's brilliant shooter *River Raid*, the biplane dodge-'em-up *Barnstorming* and the excellent *Pitfall!*, while Imagic gave us the innovative Intellivision game *Microsurgeon* and the smash-hit shooter *Demon Attack*. Parker Brothers didn't have those original concepts, but it had some real licensing might and brought games like *Frogger* and *Star Wars: The Empire Strikes Back* to market.

Not to be outdone, the console manufacturers leaned heavily on licensed games to sell their machines. GCE's newly released Vectrex offered the likes of *Berzerk* and *Scramble*, while the ColecoVision had a great launch on the strength of games like *Zaxxon*, *Turbo* and the pack-in *Donkey Kong*. The underwhelming conversion of *Pac-Man* for the Atari 2600 sold extremely well, but the movie tie-in *ET: The Extra-Terrestrial* quickly became notorious for its poor gameplay, saddling it with the infamy of becoming a byword for bad games. *Yars' Revenge* (by *ET*'s Howard Scott Warshaw) was much better for Atari's machine, eventually becoming its best-selling original 2600 game.

Cute games like *Ms Pac-Man* had well and truly caught on in arcades by this point – *Dig Dug* and *Mr Do!* were very similar games in allowing players to create their own mazes via tunnelling, but *Q*bert* was a totally different experience and managed to stand out thanks to its interesting perspective and swearing main character. In terms of technical innovations, *Zaxxon*'s isometric perspective gave the shoot-'em-up a proper third dimension for the first time.

In the home, *Choplifter!* made its Apple II debut and proved extremely popular, while *The Hobbit* and *Miner 2049er* also found success. In Japan, the enduring box-pushing puzzler *Sokoban* launched for the NEC PC-8801 and would be widely ported and exported through the decade, while Koei's *The Dragon And Princess* was an early example of the Japanese RPG format. Back home, we were enjoying the likes of *Mazogs* on the ZX81, but new machines like the Commodore 64 and ZX Spectrum would soon usurp Sir Clive's monochrome marvel.

DAVID CRANE ON ACTIVISION'S IMPACT

"Largely a result of Activision's founding, the Eighties were a great time to be a gamer with an explosion of games. Internally, we were driven to stay ahead of the competition, and we were limited only to our collective imaginations.

For me, *Pitfall!* was the culmination of expansive gameplay on the Atari 2600 – a player could only imagine what he might experience on the next screen. I am proud that people still remember *Pitfall!* with fondness more than 40 years later."

» [ZX Spectrum] Matthew Smith's platformer *Manic Miner* was a truly iconic game from the early Spectrum days.

» [Arcade] After all these years, Konami's arcade blaster *Gyruss* has lost none of its intensity.

1983

While this year is infamous for being the focus of a massive North American market recession that killed many consoles before their time, the cheap home computers that arrived in 1982 meant that things weren't all doom and gloom. The ZX Spectrum provided a home for plenty of new games developed in the UK. Matthew Smith's platformer *Manic Miner* captured the imaginations of many players, Ultimate made a name for itself with *Jetpac* and *Atic Atac*, and *Deathchase* was particularly thrilling. The Commodore 64 became popular internationally and had some superb games, too. *Beach Head* allowed players to fight World War II battles on multiple fronts, *Forbidden Forest* gave players an early taste of horror and *International Soccer* was a strong representation of the beautiful game. Compilations like *Cassette 50* started to become popular, too.

Big things were going down in Japan's computer scene as well, with plenty of foundational releases such as *Nobunaga's Ambition*, the first of Koei's historical war simulation games. *The Portopia Serial Murder Case* set the stage for Japanese adventure games and visual novels, *Bokosuka Wars* would go on to influence real-time strategy and strategy RPGs, and the maze favourite *Bomberman* arrived on the MSX.

In North America, publishers like Electronic Arts that embraced the home-computer scene ended up doing well. It released its first games in 1983, including *MULE*, *Pinball Construction Set* and the chess-style strategy game *Archon*, and soon released *One On One: Dr J Vs Larry Bird* – its first foray into the licensed sports game field it would eventually dominate. Doug Smith's frantic gold rush platformer *Lode Runner* gained international acclaim as well.

The old guard wasn't completely washed away, though – Activision's racer *Enduro* and *The Activision Decathlon* showed that there was still fun to be had with Atari's 2600. The industry decline also hit the arcades, despite the novelty of LaserDisc games like *Fire Fox*, *Astron Belt* and, of course, *Dragon's Lair*. Novel concepts like the bar-room action game *Tapper*, strong blasters like *Gyruss* and *Spy Hunter* and the movie might of *Star Wars* couldn't halt a decline in revenues but were thoroughly entertaining regardless. ▶

TRIP HAWKINS ON EA'S EARLY DAYS

"The industry's minds were boggled by the originality, quality and scope of our first flight of games. Bill Budge was the linchpin of my idea of software artists, and I loved the creativity and 'learn by doing' themes represented in *Pinball Construction Set*. From the beginning, I cared about social gaming and it was very important to me that *Archon* and *MULE* were multiplayer games. But while we knew we had potential, we needed more games on more platforms to grow our revenue so we could survive."

DEFINING GAMES

DRAGON'S LAIR

DEVELOPER: ADVANCED MICROCOMPUTER SYSTEMS

■ Powered by LaserDisc technology and Don Bluth's lush animation, *Dragon's Lair* delivered a unique arcade experience that would form the basis for QTE scenes in games like *Shenmue*.

STAR WARS

DEVELOPER: ATARI INC

■ Atari's dramatisation of *Star Wars*' trench run proved that cutting-edge coin-op technology was perfectly capable of replicating the thrills and spills of hit movies and creating smash hits in the process.

JETPAC

DEVELOPER: ULTIMATE PLAY THE GAME

■ The sheer intensity and pace of Ultimate's first game meant that it almost felt like a lost arcade game, and yet here it was, running on a humble Spectrum. It felt like witchcraft in 1983.

TRACK & FIELD

DEVELOPER: KONAMI

■ While *The Activision Decathlon* hit first, Konami's own multi-event sports game ended up going the distance thanks to its impressive animation, humorous graphics and finely crafted game mechanics across six fun events.

GRANNY'S GARDEN

DEVELOPER: 4MATION

■ The introduction of BBC Micros in British schools led to a huge influx in educational software. While American school kids tackled an updated *Oregon Trail*, we navigated this clever adventure.

ANT ATTACK

DEVELOPER: SANDY WHITE

■ Sandy White's beautifully abstract game brought the exciting isometric worlds of arcades to home computers and let you star as either a male or female protagonist as you navigated the abstract city of Antescher.

MULE

DEVELOPER: OZARK SOFTSCAPE

■ Electronic Arts' superb strategy game was cleverly designed around four players, featured complex risk vs reward mechanics and neatly encouraged both competition and co-operation in order for players to succeed.

MARIO BROS

DEVELOPER: NINTENDO

■ Nintendo's Game & Watch series seemed to be a staple of every playground by 1983. *Mario Bros* is one of the more memorable releases, complete with a lovely screen-protecting clamshell design.

DEFINING GAMES

KNIGHT LORE

DEVELOPER: ULTIMATE PLAY THE GAME

Ultimate's ambitious sequel to *Sabre Wulf* continued the exciting adventures of Sabreman and pushed the visuals and gameplay of isometric games on home computers to the absolute limit.

YIE AR KUNG-FU

DEVELOPER: KONAMI

Konami's one-on-one fighter may have featured similar controls to earlier brawlers, but its use of energy bars, weapon-carrying combatants and female fighters certainly made it stand out from its peers.

ELITE

DEVELOPER: DAVID BRABEN/IAN BELL

Few games highlight the grand designs of home computers like *Elite* does. Choice in David Braben and Ian Bell's game was absolute and its open-ended gameplay felt revolutionary at the time.

THE LORDS OF MIDNIGHT

DEVELOPER: MIKE SINGLETON

Mike Singleton was a clever coder who wouldn't be restrained by the paltry 48K offered by the ZX Spectrum. The result is a masterclass in hybrid game design.

JET SET WILLY

DEVELOPER: SOFTWARE PROJECTS

As ambitious as it was bug-ridden, Matthew Smith's ginormous follow-up to *Manic Miner* cemented him as a rising star and gave excited players a huge (often-copied) mansion to explore.

KUNG-FU MASTER

DEVELOPER: IREM

Irem's hard-hitting brawler helped establish the side-scrolling beat-'em-up and saw hero Thomas battling a variety of different bosses and numerous henchmen in his quest to rescue his girlfriend Sylvia.

KING'S QUEST

DEVELOPER: SIERRA ON-LINE

Roberta Williams was once again on hand to help with the next evolutionary leap for graphic adventures, adding animation, depth perspective and other tricks to create an exciting quest like no other.

SKOOL DAZE

DEVELOPER: DAVID REIDY/HELEN REIDY

This excellent game was not only a superb example of how everyday locations could be turned into new gaming experiences, but also offered a hint of sandbox-style gaming. It's also a setting we can all relate to.

» [Atari 8-bit] Everybody really was kung fu fighting in 1984… at least in the world of games.

» [C64] The many rooms of *Impossible Mission* were daunting places for any player to explore.

1984

The proliferation and openness of home computers really bore fruit this year, as developers explored all kinds of delightfully unusual concepts and deep gameplay models. The size of games really opened up with big adventures like *Impossible Mission*, *Elite and Jet Set Willy*, and expanded stages in games like *Boulder Dash*. Characters like Jeff Minter – who else? – could give us games with names like *Revenge Of The Mutant Camels* and *Sheep In Space*, which you just wouldn't see on shelves today. We even ended up with actively political games like *Wanted: Monty Mole*, which touched on the controversial miners' strike in the UK.

You could even see these new design sensibilities in licensed games like *Ghostbusters*. What could have been a simple action game offered a variety of gameplay elements, from driving to ghost capture and even some financial management. Another trend was a focus on fighting – Jordan Mechner's *Karateka* looked astonishing and *Bruce Lee*, an action-packed game that originated on the Atari 8-bits, soon kicked its way to other formats. Epyx's *Summer Games* also made its debut.

With the American arcade business in a slump, Japanese manufacturers really came to the fore in 1984. Data East, Konami and Irem innovated with *Karate Champ, Yie Ar Kung-Fu* and *Kung-Fu Master* respectively, while Nintendo came out swinging with *Punch-Out!!*. That wasn't all it had to offer as *Duck Hunt* jumped from the Famicom to the arcade, too. Capcom made its presence felt with its World War II shooter *1942*, Tehkan's *Bomb Jack* also launched with a bang and Pac-Man found himself in platform action in *Pac-Land*. From the American side of things, Atari Games offered a rare bright moment with the surreal obstacle course *Marble Madness* designed by Mark Cerny.

Though Activision's *HERO* was a worthwhile addition to the Atari 2600 library, console action was largely limited to Japan where Nintendo was building out the Famicom's line-up with games like *Ice Climber* and *Balloon Fight*. In the Japanese home-computer scene, RPGs continued to gain popularity as Falcom's *Dragon Slayer* helped to codify action RPGs and *Hydlide* added to it soon after. But the most addictive computer game of the year originated in the Soviet Union – Alexey Pajitnov's *Tetris*.

CHRIS WILD ON THE HOME COMPUTER REVOLUTION

"I don't think I owned my own Spectrum in 1984, but I was definitely using my brother's, hooked on playing *The Lords Of Midnight*, and anything by my idols the Stampers at Ultimate. When you look at the games released in that year, you can see the quick advancement of quality and technique as developers felt their way around the edges of what the Spectrum could achieve; quickly iterating code, design and art, creating new genres and moving the only slightly older ones forward."

» [Arcade] *Gradius* – or *Nemesis*, if you prefer – would become an iconic entry in the shoot-'em-up canon.

1985

If there's one thing that people love, it's a bit of novelty, and this turned out to be an excellent way to get people back into arcades. *Hang-On* gave players a full-body experience with a massive motorbike that had to be tilted for control, straddling the line between videogame and fairground ride. The racer's success inspired plenty of similar games from many companies through the rest of the decade, including Sega's own *Space Harrier* later in the year.

Regular old games weren't done though, as a number of genres were taken to new heights this year – or new heights of difficulty in the case of platform games, as *Ghosts 'N Goblins* was tougher than a two-dollar steak. *Gradius* offered a novel power-up system and some fascinating shoot-'em-up stage design, while *TwinBee* swapped military and space themes for something altogether cuter. Konami didn't just have those up its sleeves, as *Green Beret* was to sideways scrolling run-and-guns what *Commando* was to overhead ones.

Back on home computers, *Rescue On Fractalus* drew praise for its smooth flight, as well as the terrifying moments when downed friendly pilots weren't friendly at all. *The Way Of The Exploding Fist* set a new standard for one-on-one fighting games in the home with its varied moves, *Paradroid*'s robot-capturing captivated C64 owners and *The Bard's Tale* let players explore the town of Skara Brae.

Julian Gollop also came to prominence with *Chaos: The Battle Of Wizards*, a superb game of tactics based on his earlier tabletop game design. Mastertronic's *Finders Keepers* proved that budget games could be worth your time, while hit compilations like *They Sold A Million* and *Soft Aid* offered value by bundling established favourites together, though arcade conversions like *Commando* ultimately dominated sales. 1985 was also the year 16-bit systems like the Atari ST and Amiga debuted.

Over in the USA, Nintendo convinced New York retailers to stock its test launch of the NES – a machine that would surely sell on the strength of the toy robot ROB and games like *Gyromite*, since regular home videogames were clearly a faded fad. *Super Mario Bros* would ultimately prove that theory slightly wrong.

» [C64] *The Way Of The Exploding Fist* was the UK's best-selling game of the year.

EUGENE JARVIS ON REJUVENATING ARCADES

"How do you fight *Super Mario* with the same old generic button and joystick platformer? The answer is you don't. You go for more immersion with custom-input controllers like *Hang-On*'s or *Paperboy*'s handlebar/throttles. Then pump up the output action with motion actuators, bigger and higher-res screens, and bass-pumping sound systems. For players of the era, this new, more immersive experience was pure crack, and you couldn't get it at home. The same thing still works in today's arcades!"

DEFINING GAMES

SPACE HARRIER

DEVELOPER: SEGA AM2

■ Yu Suzuki's outrageously fast follow-up to his *Hang-On* games pushed Sega's super-scaler technology to its limits and offered a mesmerising blaster that elevated hydraulic arcade design to new levels.

SUPER MARIO BROS

DEVELOPER: NINTENDO R&D4

■ If *Pitfall!* started the platformer template, then *Super Mario Bros* easily perfected it. It was a truly terrific calling card for the Famicom/NES and helped turn Mario into a global superstar.

GAUNTLET

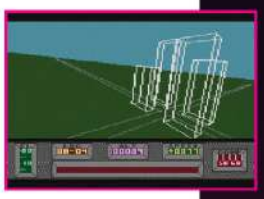
DEVELOPER: ATARI GAMES

■ Deviously designed to empty your wallet as quickly as possible, Ed Logg's supercharged take on *Dandy* featured four-player action, dangerous mazes, deadly monsters and insane amounts of speech.

MERCENARY

DEVELOPER: NOVAGEN SOFTWARE

■ While it shares traits with *Elite*, Novagen's *Mercenary* is very much its own game, creating a seemingly living, breathing world of treachery and intrigue that few other games of the time could emulate.



PAPERBOY

DEVELOPER: ATARI GAMES

■ With its bespoke bike handlebar controllers and instantly recognisable theme, Atari's *Paperboy* proved that a neat concept and interesting controls could turn even delivering papers into a worldwide hit.

COMMANDO

DEVELOPER: CAPCOM

■ Thematically rich and featuring a human protagonist, Capcom's fast-paced vertically scrolling blaster received a slew of copycat imitators but still managed to dominate both the arcade and home-computer charts.

LITTLE COMPUTER PEOPLE

DEVELOPER: ACTIVISION

■ Social simulation games are huge today, but the likes of *The Sims* can be traced back to this charming effort where you acted as a custodian for a cute on-screen character.

DÉJÁ VU

DEVELOPER: ICOM SIMULATIONS

■ This early point-and-click adventure casts you as a private eye with a wonky memory. It's notable for its strong story, focus on lateral thinking and how it tackles memory degradation.

DEFINING GAMES

TURBO ESPRIT

DEVELOPER: DURRELL SOFTWARE

■ Best described as a prototype *Grand Theft Auto*, Durrell Software's free-roaming driving game gave you four huge cities to explore and plenty of criminals to bust in whatever way you wanted.

OUT RUN

DEVELOPER: SEGA AM2

■ A trip across Europe inspired Yu Suzuki's driving game and proved that racing against the clock to toe-tapping tunes in beautiful locations could be just as exhilarating as racing other vehicles.

THE LEGEND OF ZELDA

DEVELOPER: NINTENDO R&D4

■ Crafted from Shigeru Miyamoto's love of exploration, Link's first Famicom/NES adventure would not only influence later games in the series but also arguably help inspire later action RPGs as well.

STARFLIGHT

DEVELOPER: BINARY SYSTEMS

■ Binary Systems' epic space game merged one-on-one shooting with thoughtful resource gathering and diplomacy and a rich lore of fascinating alien cultures to create absorbing sandbox-style gameplay.

METROID

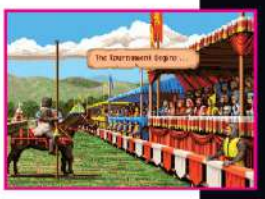
DEVELOPER: NINTENDO R&D1

■ While *The Sacred Armour Of Antiriad* featured similar game mechanics and a focus on gated exploration, Nintendo's dark space epic became the benchmark that all similar games would be judged against.

DEFENDER OF THE CROWN

DEVELOPER: CINEMAWARE

■ It also came out on the 8-bit computers, but Cinemaware's epic was instrumental in highlighting the power of 16-bit systems, thanks to its cinematic presentation.



BUBBLE BOBBLE

DEVELOPER: TAITO

■ Cute games weren't rare before *Bubble Bobble*, but rarely were they this fun and charming. A stunning two-player mode, a bouncy tune and myriad secrets made it a hit, and led to its 1987 sequel *Rainbow Islands*.

ARKANOID

DEVELOPER: TAITO

■ Thanks to eye-catching wall designs, annoying enemies and varied power-ups, Taito's *Arkanoid* revitalised a genre that had died off with *Super Breakout* and spawned countless copycat clones in its wake.

» [NES] *Castlevania* also championed a trend for spooky games that was beginning to emerge.

» [Arcade] Wonder Boy's skateboarding helped him stand out from the platform crowd.

1986

■ **This was a year in which the Japanese consoles really delivered the goods.** Konami moved its *Goemon* series from arcade to Famicom this year and Enix's *Dragon Quest* set the template for Japanese RPGs of the future, but Nintendo's focus was on the Famicom Disk System, with *The Legend Of Zelda* serving as the add-on's flagship title. Later in the year, it offered platform games with increasingly elaborate structures. *Metroid*'s innovations are inescapable, and *Castlevania*'s accomplished horror action is famed for good reason. Not to be outdone, the Master System offered *Alex Kidd In Miracle World*, which added variety with shops and vehicles, as well as its unique rock-paper-scissors boss battles.

Platform games also had a good year in the arcade – as well as *Bubble Bobble*, *Wonder Boy* brightened up arcades while Namco's *Rolling Thunder* set a template for platform run-and-guns that would be copied in the future. Plenty of other games were set apart by interesting technical gimmicks, including the spinning cabinet of *WEC Le Mans 24*, the ultra-wide display of Taito's shoot-'em-up *Darius* and the rotary joystick used to aim shots in SNK's *Ikari Warriors*.

Without such hardware trickery to rely on, home-computer games had to be conceptually inventive. *Alter Ego* was a thought-provoking social simulation in which your choice determined the outcome of your life, while the unusual puzzle gameplay of *The Sentinel* attracted acclaim for Geoff Crammond. *Quazatron* brilliantly adapted *Paradroid* to the Spectrum's strengths, and *Spindizzy* provided more isometric excitement. *Jack The Nipper*'s encouragement of infant disobedience was also fantastic, and we're surprised the concept hasn't resurfaced in modern times.

There was room for more conventional concepts, too. *Leaderboard* was the best simulation of golf to date, *Shanghai* offered many thousands of players the chance to enjoy some mahjong solitaire, and *Cobra* turned a mediocre Sylvester Stallone film into a highly entertaining run-and-gun. *Defender Of The Crown*'s strategy gameplay was captivating, but it also highlighted the power of the Amiga with some extraordinary graphics – the 16-bit machines may have arrived in 1985, but the revolution was truly upon us all now.

PAUL OWENS ON ARCADE CONVERSIONS

■ "There were several attractions to arcade conversions with the primary being that the players will know the game from the arcade. We were able to install the arcade version in the office and given that for 8-bit, we would be unable to convert the whole game (because of lack of memory/time), having the game to play made it easier for the best elements to be cherry-picked. Graphics conversion to 8-bit was always an issue, but often we had the arcade supplier's help and were able to download the original graphics from the board."

» [C64] *The Last Ninja* was a big hit thanks to its great looks and sharp gameplay.

» [Arcade] Running and gunning through side-scrolling stages wasn't all you could do in Konami's *Contra*.

1987

Much of the hardware on the market was mature by 1987, meaning that, for the most part, the dominant theme of the year was making the most of that hardware – and this yielded some brilliant results. *The Last Ninja* was at once beautiful and expansive, *Driller* offered proper 3D in the home and Archer Maclean managed to squeeze a third combatant into *IK+*. Extreme sports also hit the scene, with titles like *Skate Or Die* and *California Games*, while budget releases like *Feud* and *Dizzy* continued to thrive.

The same went for the NES, already four years old on a technical level but just arriving on UK shores. Nintendo's machine benefitted from the star power of *Mike Tyson's Punch-Out!!*, as well as the first entry in Capcom's long-running *Mega Man* series. In Japan, *Final Fantasy* arrived and carried on the RPG boom that *Dragon Quest* had inspired. The Master System was a little fresher, and alongside conversions such as *Out Run* and *After Burner*, offered players the *Metroid*-esque platform adventure *Zillion* and the brilliant science fiction-themed RPG *Phantasy Star*.

Arcade developers had to get inventive, too. Konami spiced up *Contra*'s co-op running and gunning with perspective changes, while Atari Games added combat to the racing formula to create *RoadBlasters*. Capcom allowed you to feel the action of *Street Fighter* with its pressure-sensitive buttons, and Namco allowed operators to link its twin sit-down *Final Lap* cabinets for enormous eight-player races. Taking an alternative path, Sega just decided to do '*Rolling Thunder* but with ninjas' and struck gold with *Shinobi*, a less-flashy companion to games like *After Burner* and *Thunder Blade*.

It was a vintage year in the world of adventure games, with the excellent point-and-click *Maniac Mansion* joined by the likes of the lascivious *Leisure Suit Larry*, the law-abiding *Police Quest*, *Space Quest II* and *Shadowgate*. These games were typically the preserve of 16-bit computer owners, who would also have likely been enjoying the rather tasty first-person *Dungeon Master* if they happened to be Atari ST owners. The future was 16-bit, and it was approaching fast. ▶

PHILIP OLIVER ON BUDGET GAMES

"Creating budget games in 1987 was fun for us as we'd developed a really slick development pipeline and had mastered making games on Amstrad and Spectrum. We'd challenged ourselves to make each game in a month, by taking code from previous games and reworking them to present the players with something new and original. *Dizzy* was developed from *Ghost Hunters* (written a few months before and our first Spectrum game), by adding puzzles inspired by our love of playing text adventures and setting it in a cartoon fantasy world."

DEFINING GAMES

DOUBLE DRAGON

DEVELOPER: TECHNOS JAPAN

Yoshihisa Kishimoto's game built on his earlier *Kunio-kun* brawlers and redefined the side-scrolling beat-'em-up thanks to its dynamic combat, assorted weaponry, two-player action and urbanised scrolling stages.

R-TYPE

DEVELOPER: IREM

Famed for its memorable charge shot, iconic bosses, high difficulty factor and distinctive biomechanical aesthetic, Irem's opus took the shmup genre in exciting new directions and spawned countless imitators.

BARBARIAN

DEVELOPER: PALACE SOFTWARE

Many will remember *that* cover, but it's the exciting sword-based gameplay and brutal decapitations that helped *Barbarian* prove that home-computer fighting games could be every bit as good as their arcade counterparts.

DUNGEON MASTER

DEVELOPER: FTL GAMES

FTL Games' dungeon crawler created a fertile formula for others to copy thanks to its exciting real-time combat, gruesome monsters, clever dungeon design and the ability to manipulate the environment.

HEAD OVER HEELS

DEVELOPER: JON RITMAN

Fuelled by Bernie Drummond's surreal visuals, two unique playable characters and some exceptionally crafted puzzles, *Head Over Heels* proved isometric adventures still had exciting new avenues to explore.

MANIAC MANSION

DEVELOPER: LUCASFILM GAMES

While it wasn't the first point-and-click adventure, few of its peers have been as genre-pushing as *Maniac Mansion*. It also highlighted that games could be funny while they were telling great stories.

PHANTASY STAR

DEVELOPER: SEGA R&D2

As other RPGs became mired in fantasy tropes, Sega's adventure reached for the stars and offered exciting new worlds to explore that were filled with engaging characters and fearsome monsters.

OPERATION WOLF

DEVELOPER: TAITO

Taito's gung-ho lightgun game may have riffed off the films of Schwarzenegger but allowed you to revel in a far higher body count than Arnie ever managed on the screen, all while wielding a replica Uzi.

DEFINING GAMES

ROBOCOP

DEVELOPER: OCEAN SOFTWARE

Platoon may have formed the basis of Ocean's multi-gameplay approach to film adaptations, but *RoboCop* perfected it, delivering a smash hit that many later film adaptations would attempt to copy.

JOHN MADDEN FOOTBALL

DEVELOPER: ELECTRONIC ARTS

While it lacked official licences, EA's footy title featured virtually every other aspect of the popular sport and would lay the foundations for countless sequels to come.

SUPER MARIO BROS 3

DEVELOPER: NINTENDO R&D4

Mario's third NES adventure proved another monumental shift in what gamers expected from a platform game. It also highlighted that Nintendo was becoming pretty much untouchable within the genre.

DRAGON QUEST III

DEVELOPER: CHUNSOFT

Though it's notable for its flexible character classes, this hit RPG is best remembered in Japan for being so highly anticipated that hundreds of children bunked off school so they could buy it.

CHASE HQ

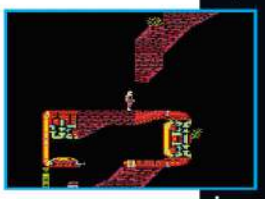
DEVELOPER: TAITO

Although Taito's high-speed racer did give you a tight time limit to contend with, it was more concerned with having you aggressively take down fleeing felons as quickly as possible.

EXILE

DEVELOPER: PETER IRVIN/JEREMY SMITH

While it's perhaps best-known for its *Metroid*-like structure and hard-to-get-used-to gravity, *Exile*'s greatest achievement is in building a unique living world that felt far beyond what similar games were offering.



WASTELAND

DEVELOPER: INTERPLAY PRODUCTIONS

Featuring gameplay based on popular tabletop mechanics of the time, *Wasteland*'s apocalyptic setting, engaging writing and willful NPCs helped influence countless later games, including a little series called *Fallout*.

MEGA MAN II

DEVELOPER: CAPCOM

Capcom's sequel is a vastly improved follow-up, adding challenging level layouts, terrific boss designs and memorable weapons. Little wonder it went on to become the most successful game of the series.

» [PC Engine] Good: new console. Bad: brains and guts in a pinball game? That's just nasty.

» [Arcade] Wallop the things, watch them splat against the wall. That's kind of gross too.

1988

The moral authorities were sure to be out in force when they saw the kinds of games that started showing up in arcades in 1988. Namco's *Splatterhouse* was a beat-'em-up love letter to the gory horror films that were so popular during the decade, while *NARC* went for the over-the-top action-movie route, justifying its bloodshed by casting the enemies as drug traffickers. Of course, the real thing wasn't too far away as *RoboCop* was a hit in both the arcades and the home for Data East and Ocean Software.

Even on the home computers, it was hard to avoid these themes – gore was also a key feature of the cult cyberpunk adventure *Snatcher*, the Japanese game that was arguably Hideo Kojima's most famous work of the decade. Back here in the UK, if you weren't working through Ocean's excellent *Platoon*, you might well have been taking out street thugs in *Target: Renegade*. Fortunately, *MicroProse Soccer* steered clear of any violence on the terraces and delivered a sensible take on football, though *Speedball* ensured that violence and sport retained their long-standing connection.

Nintendo's adverse stance towards violence ensured that the NES version of *Ninja Gaiden* didn't have anything gory going on, instead providing good clean platform fun that contrasted with the beat-'em-up action of the arcade game (called *Shadow Warriors*). Meanwhile, blasters like *Armalyte* and the Master System's *Power Strike* kept the screaming deaths on a more theoretical level, which will have been a relief to concerned parents everywhere.

1988 was also the year that import games became attractive to the UK audience, as news of new super consoles from Japan arrived in magazines. The diminutive PC Engine offered up conversions of *R-Type* and *Space Harrier*, as well as the creepy pinball game *Alien Crush* and the platformer *The Legendary Axe*, all of which were as good as the screenshots made you imagine they might be. Late in the year, Sega would launch the Mega Drive with a sequel to *Space Harrier*, which at the very least looked great on paper.

TONY TAKOUSHI ON IMPORT GAMES

"With the arrival of the Sega Master System and the 8-bit consoles I was hungry for more… so looked to Japanese mags and saw there was another world of machines and games out there! This was an absolute *thrill* to me at the time, so I devoured the mags and made calls to find out more. The response in *CVG* was amazing and the editor asked me to expand it to two pages and I went hunting for more 'gold' – the results spoke for themselves, as the Mean Machines section exploded in popularity."

» [Arcade] Burly brawls were the flavour of the year in the coin-op world, and rightly so.

» [Atari Lynx] *Blue Lightning* was an impressive display of the graphical prowess of Atari's new handheld hardware.

1989

If you were a fan of beat-'em-ups, arcades at the end of the Eighties were the place to be. Whether you favoured *Golden Axe*'s fantasy theme and spectacular magic attacks, the four-player cartoon action of *Teenage Mutant Ninja Turtles* or the more traditional urban combat of *Final Fight*, there was something for everyone. Elsewhere in the arcades, *Strider*'s acrobatic action and the driving games *Super Monaco GP* and *Hard Drivin'* turned heads.

Strategy games including *North & South*, *SimCity* and *Populous* were in vogue on the home computers, as were shoot-'em-ups like *Battle Squadron* and *Xenon 2: Megablast*. It was a good year for point-and-click adventures like *Indiana Jones And The Last Crusade* and *The Colonel's Bequest*, too. Meanwhile, games like *Shadow Of The Beast* and *It Came From The Desert* really took advantage of the Amiga hardware, but games like *Myth: History In The Making* and *Stunt Car Racer* were great across all formats. The brilliant *Prince Of Persia* also landed this year, but only on the Apple II – other platforms had to wait.

If you were following the import game scene, you got an early glimpse of technologies that would carry us into the Nineties. Handheld games came of age this year thanks to new hardware launches, with the Atari Lynx boasting the impressive air combat game *Blue Lightning* and a great conversion of *California Games*. Nintendo's Game Boy had a range of great early games too, including *Pinball: Revenge Of The Gator*, *The Final Fantasy Legend*, the iconic *Super Mario Land* and its pack-in game *Tetris*.

Super Hang-On, *Truxton* and *Golden Axe* were the kind of arcade conversions that convinced many to import Sega's 16-bit Mega Drive, and the PC Engine offered plenty of great games of its own, including *Bonk's Adventure*, *Military Madness* and the action RPG *Neutopia*. However, the HuCard games took a back seat to CD-ROM games this year. An accurate conversion of *Wonder Boy III: Monster Lair* and particularly the RPG *Ys Book I & II* really shined – with fantastic cutscenes, plenty of voice acting and amazing music, it offered a tantalising glimpse of what the technology could offer us in the coming decade. That's a story for another time, though...

JIM BAGLEY ON THE GAME BOY

"I think the Game Boy was so popular because the batteries lasted for a lot longer than the competition, the Game Gear and especially longer than the Lynx. Also the game that came with it, *Tetris*, was such an addictively playable game, and from a developer's point of view it was a nice system – it was like a monochrome Speccy but with hardware sprites. I wrote *Defender* for the Game Boy, which is a fast-scrolling game which made the screen really blurry, but it was a nice console to program for."

DEFINING GAMES

POPULOUS

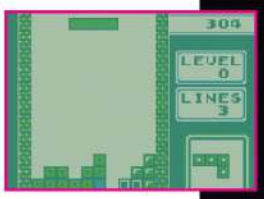
DEVELOPER: BULLFROG PRODUCTIONS

Bullfrog's inventive strategy game allowed you to play god and helped spawn a brand-new genre in the process. Whether you're using manipulation or divine intervention, leading your followers to victory is always satisfying.

TETRIS

DEVELOPER: NINTENDO R&D1

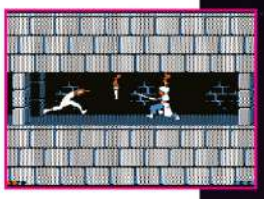
Granted, *Tetris* had existed long before its Game Boy iteration came along, but it was that multi-million-selling version that arguably turned Alexey Pajitnov's classic puzzler into a household name.



PRINCE OF PERSIA

DEVELOPER: JORDAN MECHNER

Building on what he learned from *Karateka*, Jordan Mechner's follow-up fused cinematic storytelling with intense platform action and derring-do swordfighting, all finished off with some impossibly slick rotoscoped animation.



FANTASY WORLD DIZZY

DEVELOPER: THE OLIVER TWINS

Budget games were absolutely huge during the late-Eighties and no budget hero was bigger than Dizzy. Created by the Oliver twins, Dizzy's third adventure remains his best and proved that big games didn't need big price tags.

HARD DRIVIN'

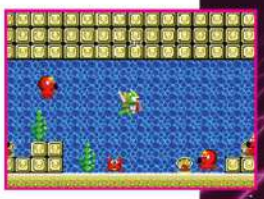
DEVELOPER: ATARI GAMES

Namco's *Winning Run* may have pushed polygons in arcade racers first, but Atari's seminal game let you tackle jumps and stunt loops while offering a convincing physics engine and a realistic car shell.

WONDER BOY III: THE DRAGON'S TRAP

DEVELOPER: WESTONE

While *Metroid*-like in its structure, its reliance on switching animal forms to continue progress certainly helped Westone's enjoyable game forge its own unique path.



THE REVENGE OF SHINOBI

DEVELOPER: SEGA R&D2

Home computers still dominated in the late-Eighties, but Sega's sequel, with its arcade-like visuals and epic boss fights was an appealing showpiece for the new console generation.

SIMCITY

DEVELOPER: MAXIS

Will Wright's epic city-builder helped revolutionise the genre and received huge acclaim. Its structure meant that it stood apart from other strategy games and led Maxis to create all manner of *Sim* follow-ups.

PAC-MAN

GAMING'S FIRST ICON

NAMCO'S YELLOW MASCOT STANDS PROUD AS THE INDUSTRY'S FIRST RECOGNISABLE VIDEOGAME STAR. WHEN PAC-MAN CELEBRATED HIS 40TH YEAR, WE FELT IT WAS THE IDEAL TIME TO SIT DOWN WITH PAC-MAN CREATOR TORU IWATANI AND QUIZ HIM ABOUT HIS GROUNDBREAKING GAME

WORDS BY NICK THORPE AND DARRAN JONES

WELCOME TO THE WORLD OF PAC-MAN

It's astonishing to think that one of the biggest gaming phenomena of the Eighties was contained within just 24 kilobytes of data. Coded by Namco's Toru Iwatani and released for location testing in Shibuya, Tokyo in May 1980 after 17 months of gruelling coding, *Puck-Man*, as it was then known, went down well with those that were able to play it. Encouraged by those early playtests, *Pac-Man* soon went on full release in Japanese arcades, but it wasn't until Iwatani's game reached the shores of America and the rest of the world that Namco's newest arcade offering really achieved planetary domination.

Before it landed in western arcades, Namco America requested numerous changes to *Puck-Man*, including renaming three of the ghosts from Akabei, Aosuke and Guzuta to Blinky, Inky and Clyde (only Pinky retained its original name). However, the biggest change was undoubtedly the request to change the game's title due to worries over potential vandalism (the entire story entered pop culture history thanks to Bryan Lee O'Malley's *Scott Pilgrim* graphic novel and Edgar Wright's subsequent film adaptation). *Puck-Man* became *Pac-Man*, and with this new moniker, the game became absolutely huge, much to the delight of Midway Games, as it had agreed to distribute both *Pac-Man* and *Rally-X* for Namco.

Pac-Man became a worldwide success, and numerous sequels and merchandising opportunities followed in a gigantic tidal wave of *Pac-Man* fever that swept across the globe. Media attention, high-score competitions and a constant stream of paraphernalia helped turn Toru Iwatani's character into a household name, a legacy that has now endured for more than four decades. The success of *Pac-Man* led to a slew of imitators and clones, particularly in the home, including *Snapper*, *Munch Man*, *Snack Attack* and *KC Munchkin!*. Some of these games received lawsuits from Atari, as it had secured the rights for home use and had released an official conversion for the Atari 2600. As annoying as these clones were for Atari, they highlighted just how much demand there was for Namco's lovable little yellow pellet-muncher, who continued to find success in the arcades throughout the Eighties and early Nineties, and eventually, into the world of home computers and consoles.

The legacy of *Pac-Man* and its importance to gaming is well-known thanks to excellent documentation and the sheer cultural impact Iwatani's game has had in the last four decades. American games writer Cat DeSpira revealed in a brilliant 2019 article how the paint on the left-hand sides of *Pac-Man* cabinets was worn down due to the way arcadegoers gripped it during play (you can read about it at bit.ly/pacmanuntold) while Alex Wade and Van Burnham are just a few of the authors who have examined the cultural importance of the coin-op classic. As Namco continues to celebrate *Pac-Man*'s success with a host of new games and products that keep the little guy feeling fresh, it's obvious that our obsession with Toru Iwatani's iconic creation shows no sign of diminishing any time soon. ▶

CONTENTS

34 SPECTRAL SABOTEURS
Toru Iwatani is on hand to navigate us through the complex artificial intelligence that helped make *Pac-Man* a hit.

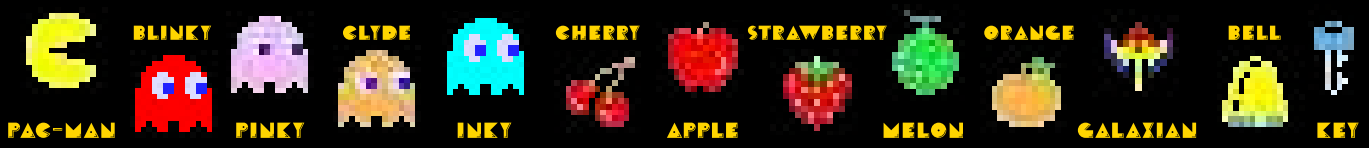
35 MAZE GAMES
Explore the game screen and discover the unique behaviours that make Blinky, Pinky, Inky and Clyde so distinct.

36 DESIGNED TO PAC ARCADES
Learn the origin of *Pac-Man*'s design with Iwatani-san and discover how *Pac-Man*'s abilities have evolved over the years.

37 THROWPAC FASHION
Discover Pac-Man's many makeovers that have kept the icon relevant for over four decades in pop culture.

38 AHEAD OF THE PAC
Jon Stoodley explains what it's like taking part in the competitive *Pac-Man* high score scene and why he prefers it to *Donkey Kong*'s.

PIXEL PERFECT



SPECTRAL SABOTEURS

HEROES ARE ALL WELL AND GOOD, BUT THEY NEED VILLAINS TO CONTRAST WITH. ENTER THE GHOSTS, PAC-MAN'S LONG-TERM ADVERSARIES AND THE DRIVING FORCE BEHIND THE GAME DESIGN. TORU IWATANI EXPLAINS THEIR IMPORTANCE AND HELPS US TO UNDERSTAND THEIR UNIQUE QUIRKS

When retro gaming rappers Duane and BrandO did a song based on *Pac-Man,* half the performance was from the perspective of the ghosts, and that's no less than they deserved. After all, what would Pac-Man be without them? He'd just be a gluttonous chap wandering around a confined space and eating everything in sight, rather like us on a lazy Sunday. The big secret is that while Pac-Man is the star of the show, from a game design perspective, the quartet of persistent persecutors that inhabit Pac-Man's maze are arguably far more important than he is.

Unlike most videogame enemies of the time, the ghosts in *Pac-Man* each have identifiable behaviours that distinguish them from one another. This was actually made clear to players on the title screen of the game, with words describing the 'character' of each ghost. But why give them these unique traits in the first place? "Programming the four ghosts to chase after Pac-Man using the same algorithm would simply make them all follow the same path toward Pac-Man, thus making the game bland," says Iwatani. "So we gave them 'personalities' using an AI algorithm where the ghosts would spread and move differently, all the while putting the pressure on Pac-Man."

As a result, it's crucial that you understand the way that the ghosts behave if you're to have any hope of playing *Pac-Man* well. This was recognised very early on – when *Computer & Video Games* dedicated most of a page to *Pac-Man* tips in its debut issue, much of the focus was on the ghosts and the way they operate. At that time, players had cottoned on that some ghost behaviours changed based on their location relative to Pac-Man, and that "a vigorous shake of the lever can confuse the ghosts", but the mechanisms dictating these behaviours were not understood. The bottom of the maze was identified as a particularly dangerous area, but reasons for this were not provided.

Today, we have a full understanding of what makes Inky, Pinky, Blinky and Clyde tick, gained by looking at the inner workings of the program. The game begins with the ghosts in 'patrol' mode, but they soon switch to 'chase' mode. During this time, each ghost has its own target, based on different rules that mostly relate to Pac-Man's position and direction of travel. When a ghost reaches a junction, it makes a decision to turn based on which direction would give it the fastest straight-line route to its target.

As well as allowing us to understand the ghosts, looking at the program also reveals the coding flaws and compromises that give them a little extra personality. For example, the simple straight-line calculation that ghosts use at junctions is one born of necessity, but one that means that the ghosts don't always choose the most efficient routes based on the actual layout of the maze. However, the more interesting one is that when Pac-Man is facing upwards, a bug means that Pinky and Inky set their targets to the left of where they should be – making their behaviour less predictable and much more dangerous.

"WE GAVE THEM 'PERSONALITIES' USING AN AI ALGORITHM WHERE THE GHOSTS WOULD SPREAD AND MOVE DIFFERENTLY, ALL THE WHILE PUTTING THE PRESSURE ON PAC-MAN"

TORU IWATANI

[Arcade] Part of what makes the ghosts so appealing is that you can turn the tables on them, at least temporarily.

PINKY

If any ghost manages to get ahead of you and create a trap in combination with Blinky, Pinky is typically the culprit. "The pink ghost intercepts Pac-Man by targeting the location 32 dots in front of Pac-Man," Iwatani explains. This means you can sometimes win a game of chicken with Pinky when approaching a junction, as she will start aiming for a target behind her current position.

PATROL ROUTES

After a few games, you should notice that each ghost has a 'home corner' that it will patrol from time to time, rather than chasing Pac-Man. It's easy to tell when they're changing their behaviour modes, as they'll all abruptly change direction when they do. It's particularly important to bear this route in mind for Clyde, as he will start to follow this path when you get too close to him.

THE TUNNEL

One of the first tricks you'll learn when playing *Pac-Man* is to head for the tunnel when the ghosts are in hot pursuit, as they'll slow down while passing through. This can give you some breathing space, so long as you can effectively manage your route coming out of the tunnel. Of course, you should check that the other end is clear before you attempt this strategy, as there's only one exit.

INKY

The trickiest of the ghosts to predict, since his behaviour relates to more than one factor. "The cyan ghost moves towards the direction derived by applying point symmetry to *Pac-Man*'s core," says Iwatani. The best explanation is that Inky finds the space 16 pixels ahead of Pac-Man, calculates Blinky's distance from that space, then doubles the length of that line and targets the end of it.

CLYDE

"The orange ghost moves toward its designated position when coming too close to Pac-Man," says Iwatani. When Clyde is at a distance, he will follow the same targeting rules as Blinky. However, when he is within a certain range, his behaviour changes and he will revert to trying to get back to his patrol route. As a result, he is at his most dangerous in the bottom-left corner of the maze.

BLINKY

When you find yourself with a ghost nibbling at Pac-Man's backside, it's usually this chap. "The red ghost chases Pac-Man directly," highlights Iwatani. "The red ghost's speed comes with the game's difficulty progression. This design choice was due to the unique setup of arcade games – we needed to ensure that the game isn't something that could be played forever, so to speak."

SECRET ESCAPES

One thing that novice *Pac-Man* players don't know is that the ghosts can't travel upwards when they reach these four junctions. If you can get them all to chase you to this point, this is another place where you can gain some much needed personal space for our persecuted pal. But there's an exception – the ghosts *can* go upwards in these passages if they've been turned blue.

✕ TARGETS (COLOUR CODED PER GHOST, NONE FOR CLYDE)

! MODE CHANGE (CLYDE ONLY)

DESIGNED TO PAC ARCADES

AS ONE OF THE FIRST IDENTIFIABLE PROTAGONISTS IN VIDEOGAMES, PAC-MAN'S DESIGN WAS OF PARAMOUNT IMPORTANCE TO THE SUCCESS OF THE ORIGINAL ARCADE GAME AND THE SERIES AT LARGE. TORU IWATANI ELABORATES ON SOME OF THE DECISIONS THAT GAVE US THE ICON WE KNOW TODAY

A ghost chases Pac-Man off the screen, only to be chased right back by a much larger Pac-Man. It's a simple intermission scene, offering a little bit of humour and personality based on the hero's ability to turn the tables on his foes, made to look quaint by the rapid progress of technology. But four decades on, it's easy to forget just how unusual it was for a videogame to have a star character at all. Many games of the Seventies put players in control of cars, tanks, spaceships and other vehicles, with the most recognisable characters of the decade being the Space Invaders – nameless enemies without any personality traits to speak of.

Why did Namco adopt this revolutionary approach to gaming presentation? According to *Pac-Man*'s designer Toru Iwatani, the answer lies in reaching across demographics. "The concept of creating a cartoonish hero came from the idea of making the game so that it appeals to females and couples," he explains. "We designed the characters, such as the enemy ghosts, so that they look cute, and incorporated a likeable character relationship similar to the characters in the cartoon *The Tom & Jerry Show*, and in that sense, I believe the cartoonish style made it very recognisable and liked by our gamers."

The story behind *Pac-Man*'s visual appearance is one that many people know, albeit in incomplete form. While it's true that *Pac-Man* was inspired by a pizza with a slice removed, that's not the whole story – in Susan Lammers' 1986 book *Programmers At Work*, Iwatani also explained that the circular shape was achieved by rounding off the Japanese kanji character for 'mouth', which is a simple square shape. But what of Pac-Man's personality? "I imagined Pac-Man to be a creature that exists to simply 'eat' without much emotions as well as to be a nice guy to eat all the evils he saw out in his world," says Iwatani. "I also didn't give him eyes, so that his emotions can't be seen." Of course, while this worked for the in-game sprite, the need for striking cabinet artwork led to more relatable, human features. "I didn't initially imagine having Pac-Man with arms and legs, but I wanted to make sure the arcade cabinet left a lasting impression, so from an industrial design standpoint, I think it worked well," Iwatani recalls.

> "I IMAGINED PAC-MAN TO BE A CREATURE THAT EXISTS TO SIMPLY 'EAT' WITHOUT MUCH EMOTIONS AS WELL AS TO BE A NICE GUY TO EAT ALL THE EVILS HE SAW OUT IN HIS WORLD"
>
> **TORU IWATANI**

According to Iwatani, the environment that *Pac-Man* inhabited was given just as much thought as the character himself. "I didn't want to make the game seem difficult and deter players away with its mazelike design, so it was crucial to ensure that the game was accessible to everyone. We did this by designing the maze in a way that it doesn't become the focus of attention, such as thinning the walls and making them neon blue so that the walls would blend with the black background. We also made sure that the rules and the controls were as simple as possible," he explains. "In addition, as mentioned earlier, I think the cartoon style [we] used helped in creating characters that appealed and resonated well with the player, so I would say that's a key aspect toward his design."

The decisions made in those early days have informed the character's later development. While his simple shape and love of eating have remained, the version of the character that appeared on the cabinet ultimately gave more room to grow – after all, running and jumping in *Pac-Land* would have been much harder without limbs. ▶

PAC-POWERS

SOME OF PAC-MAN'S MORE NOTABLE SKILLS AND ABILITIES FROM OVER THE YEARS

BIG EATER

Pac-Man's signature ability is his desire to gobble up everything in sight – and with the aid of a Power Pellet, he can even chomp down on enemies and send them packing temporarily.

GIANT GROWTH

Although Pac-Man first went big in one of the original game's cutscenes, *Super Pac-Man* was the first game featuring that ability, allowing Pac-Man greater speed and the ability to smash doors.

JUMPING

Platform spin-off *Pac-Land* gave our hero the simple ability to jump, but it transferred into the original maze game format by the end of the Eighties, thanks to the isometric outing *Pac-Mania*.

PYROMANCY

Pac-Man's ability to shoot fireballs first became apparent in *Pac-In-Time* – a reskinned *Fury Of The Furries*. He has since demonstrated his fire-throwing powers in the *Ghostly Adventures* series.

SWIMMING

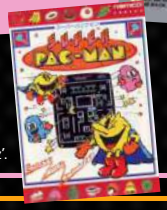
After struggling with water in *Pac-Land*, our hero learned to swim for *Pac-In-Time*, where he could also blow bubbles. Unlike his fiery abilities, swimming carried over to the *Pac-Man World* series.

THROWPAC FASHION

THE MAKEOVERS THAT HAVE HELPED PAC-MAN STAY FRESH OVER FOUR DECADES

1980–1989

In his first appearance, Pac-Man's key traits are all established – his overall shape, colour scheme and demeanour form the basis of today's hero. Of course, Midway's American cabinet art took all of this and discarded it for a rather freaky-looking red-eyed, armless nightmare. After experimenting with fashion accessories – a cape in *Super Pac-Man*, a snazzy hat in *Pac-Land* – his fame went to his head somewhat, and he finally settled on a nose job in *Pac-Mania*.



» Pac-Man experimented with capes in *Super Pac-Man*, however we don't think this gives him much 'rizz'.

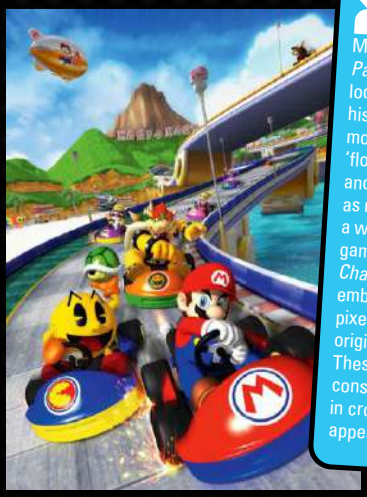
» We hold a special place in our hearts for the *Pac-Mania* poster version of Pac-Man. It's simple, friendly and perfects that iconic look.

1990–1999

As Pac-Man matured, he started to experiment with a wider range of facial expressions. Unfortunately, it's pretty obvious that his somewhat sinister grin in *Pac-Panic* and his abject terror in *Pac-Man 2: The New Adventures* were not his best looks. He properly transitioned to the third dimension in the *Namco Museum* games, and began to inhabit a neat 3D version of his classic body just in time for his 20th anniversary in platformer *Pac-Man World*.

» Not even in the seven circles of Hell would you find a face as terrifying as the one featured on the box for *Pac-Man-2: The New Adventures*.

» *Pac-Panic* shows off a more sinister iteration of Pac-Man on its artwork, who is the real antagonist here? It doesn't look like the ghosts, that's for sure.



2000–2009

Moving into the new millennium, *Pac-Man* embraced a trio of official looks. As well as 2D and 3D versions of his classic limbed look, we began to see more of the *Pac-Mania* sprite's simplified 'floating orb' look in game artwork and merchandising. Additionally, as retro gaming became more of a widely appreciated activity, games like *Pac-Man Championship Edition* embraced the chunky pixels of Pac-Man's original sprite. These remained consistent, even in crossover appearances.

» *Pac-Man 256* embraced the original chunky sprite version of Pac-Man and supercharged it into the 21st century.

2010–2019

Looking for ways to refresh Pac-Man's image, most of the attention was placed on tinkering with his limbed look. *Pac-Man And The Ghostly Adventures* gave him additional details like shoelaces and eyelids, while mobile games such as *Pac-Man Pop* and *Pac-Man Party Royale* tended to make him more stylised, rather like an anime character or a Funko Pop! figure. Elsewhere, his classic looks remained intact in the likes of *Pac-Man Championship Edition 2*.

» The *Championship* version of Pac-Man is everything you'd want from modern Pac-Man, where the *Pac-Man Pop!* iteration haunts our nightmares.

REV ROLL

Borrowing a trick from another gaming star in *Pac-Man World*, the yellow fellow charges up on the spot before rolling off at high speed, enabling him to smash into enemies and climb steep hills.

BUTT BOUNCE

Given his entirely round body, can Pac-Man even be said to have a butt? Regardless, by leaping into the air and slamming down on his backside, Pac-Man can defeat enemies and activate switches.

PELLET PELT

In *Pac-Man World*, our pac-tastic protagonist can actually make use of the pellets he has collected by chucking them at enemies. You can also charge your shot for an added dose of explosive impact.

CRYOMANCY

The *Ghostly Adventures* games added ice powers to Pac-Man's arsenal, to complement his power over fire. As well as freezing enemies, this lets you freeze water to create temporary platforms.

TRANSFORMATIONS

By munching on a Power Berry in the *Ghostly Adventures* games, Pac-Man can transform into a robot, a chameleon and even a bouncy rubber ball in order to beat baddies and solve puzzles.

AHEAD OF THE PAC

HIGH SCORES AND COMPETITIVE PLAY ARE AT THE HEART OF THE ARCADE EXPERIENCE, AND PAC-MAN OFFERS ALL THE THRILLS YOU'D EXPECT IN THAT REGARD. WE SPEAK TO JON STOODLEY, ONE OF THE FEW PEOPLE TO HAVE EVER PLAYED A PERFECT GAME OF PAC-MAN, ABOUT THE GAME'S COMPETITIVE SCENE

As an arcade classic with a strong following today, *Pac-Man* has a competitive scene. Unlike many of them, it has a defined maximum score – 3,333,360 points. To achieve it, you have to get every bonus fruit and munch all four ghosts with every power pellet, on every single stage up to the level 256 kill screen, without losing a life. Few have ever achieved this monumental feat, but Jon Stoodley is one of them.

How did you first encounter *Pac-Man*, and what did you think of it?
Pac-Man arrived at the arcade in early 1981 but initially I had no interest in it. I was playing *Berzerk* and *Space Invaders* then, and it was my brother who got me into playing two-player games with him. He was a 100,000-point player, and within about a month, I passed his scores. A group of lads in the arcade were all competing for the highest score, and I then concentrated on *Pac-Man*.

» Jon's achievement earned him a place in Twin Galaxies founder Walter Day's trading card collection.

Why did you choose to master *Pac-Man*?
In the summer of 1982, my high score was over 280,000 and I witnessed an American guy play to over a million points with a big crowd watching. Las Vegas arcade in Liverpool was the premier place to meet up at the weekend for gamers, as they had all the latest releases. Watching someone easily beat my high score spurned me on to push myself as far as I could.

Were there any resources that helped you towards your goal of a perfect game?
Tim Balderramos of the US is one of the 'perfect club' and he shared some freehand grouping strategies with me live on a Twitch TV stream. I didn't have any intention to go for the perfect game, but my good friend and fellow Brit Tony Temple (*Missile Command* tournament world record holder) asked me if I thought I could reach perfection on *Pac-Man*. We'd been to the US several times and played live in Funspot during the tournament days, and we really enjoyed representing the UK there. The only gamers in the 'perfect club' were from North America, so the challenge was on.

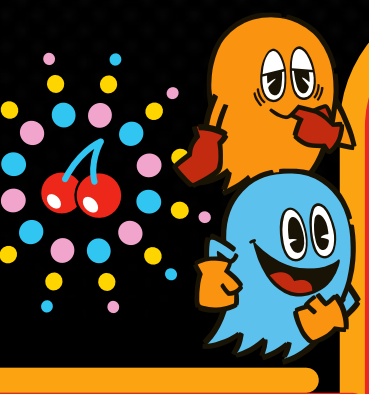
How long did you have to practise to get to the point that you could achieve a perfect *Pac-Man* game?
I only played and practised on my original *Pac-Man* cab, and only live. Either at one of the events around the UK, live in the US, or live on Twitch TV. This wasn't to be elitist, I was, in fact, competing with myself from back in the day. It had to be done the same way as it was at the arcade. It took about two years in total to achieve the perfect game, which happened at the Play Expo event at the Winter Gardens in Margate, August 22 2015.

How did you feel when you finally achieved the maximum score?
Tired... that weekend, I played for 14 hours in total. On the Saturday, I had a perfect run break down at 2.2 million. When I finally realised that I'd achieved it, of course, I felt elated, but I guess the sacrifices and total commitment needed to achieve the perfect game sort of moulds you into a calm and totally concentrated gamer. Calm on the outside, keeping it cool inside.

In some games, competition over high scores can get quite fierce. How would you characterise the *Pac-Man* high score scene?
The *Pac-Man* scene has always been pretty competitive, but not like the shenanigans seen for the likes of *Donkey Kong*, thank heavens. I did have to pay my dues competitively in the US I guess, driven on by the intention to achieve perfection. Playing at an elite level always has its drawbacks I guess, for me personally, the dedication and commitment to be included in the perfect club had me laser-focused on just one thing. Because I was probably considered an 'outsider' playing abroad, the pressure to perform live was there for sure. Thing is, though, I really had an

TIMELINE

THE KEY DEVELOPMENTS IN THE HISTORY OF PERFECT PAC-MAN PLAY



1 JULY 1999
Canada's Rick Fothergill sets a world record of 3,333,270 points, missing a perfect score by just 90 points.

3 JULY 1999
Notorious score-chaser Billy Mitchell hits 3,333,360 at the Funspot Arcade – the first recorded perfect game.

31 JULY 1999
Rick Fothergill submits his own perfect score to Twin Galaxies – the oldest standing score for the game.

16 FEB 2000
Then-holder of the *Ms Pac-Man* record Chris Ayra becomes the third person to achieve a perfect *Pac-Man* game.

4 DEC 2004
Tim Balderramos records his own perfect score, adding to his *Commando* and *Tunnel Runner* records.

21 JULY 2005
Donald Hayes also clocks a perfect score, taking a mammoth five hours, 24 minutes and 46 seconds to do so.

27 JUNE 2008
The first perfect score under 'Turbo' speed rules is submitted by Donald Hayes, marking another perfect run.

» Jon takes some time to give an interview during a more recent retro gaming event.

advantage as all my *Pac-Man* performances were live and in front of a crowd. I thrive on this and playing alone has never interested me.

Pac-Man has a known maximum score – what effect does that have on the game's competitive scene?

There's always going to be gamers attempting perfection on *Pac-Man*, it's an icon. The competitive scene for *Pac-Man* will always be there, but like it was in the arcades I guess. Gamers of all ages trying to beat that 'high score', playing two-player games like I did in the Eighties, and laughing and enjoying it on the way. Competitive *Pac-Man*, like attempting perfection etc, isn't a real reflection on the original game's magic. There's little fun with elite gaming, as it can be pretty solitary and insular. Only 100% focus, every game, every time. Nothing less.

Do you have any expert tips that a novice _Pac-Man_ player could practise to improve their own scores?

Remember that sometimes the ghosts aren't following you. They go straight to their respective corners when you press start, then reverse to pursue Pac-Man. It was with this knowledge, the early players utilised patterns to avoid the ghosts. Always try and 'pre-turn' before a corner or junction. That is to move the joystick in the direction you'd like to go a fraction before that turn. This way, there's no pausing, allowing the ghosts to gain ground on you. Always log your high scores and raise your personal bar. Try and relax your wrist. Pressing hard on the joystick doesn't give you extra speed! Most of all, enjoy the experience. Classic videogames were really a blank canvas with the basic features and rules laid out for you. Every classic game has many layers for the gamer to discover and evaluate for themselves. That's the beauty of these 40-year-old games, just use your imagination and get immersed. There's really nothing quite like retro gaming. ▶

PAC PEAKS

SOME PAC-MAN WORLD RECORDS THAT YOU MIGHT ACTUALLY BE ABLE TO BREAK

PAC-MAN

FORMAT
Atari 2600

SCORE
325,116 (Ken Anderson)

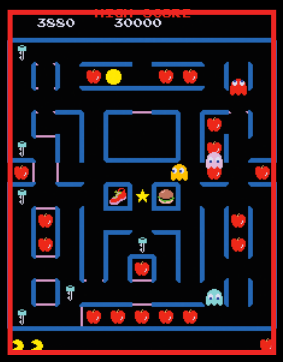
■ It's not the most authentic conversion, but this was a popular cartridge in its day. This score, set on an NTSC console using Game 1, Difficulty B settings, has stood since 1983.

PAC-MAN CHAMPIONSHIP EDITION DX

FORMAT
PlayStation 3

SCORE
718,900 (Ethan Daniels)

■ This game was designed for competitive play, and the king of that in the Championship I Score Attack (five mins) category is Ethan Daniels, whose record has stood since 2015.

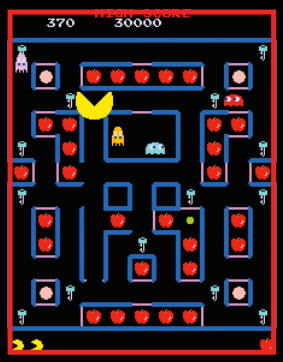


SUPER PAC-MAN

FORMAT
Arcade

SCORE
12,111,640 (Robbie Lakeman)

■ While this record is relatively new, being set as recently as October 2015, topping it will be tough – the holder is a noted competitive gamer and former *Donkey Kong* champion.



MS PAC-MAN MAZE MADNESS

FORMAT
PlayStation

SCORE
24 seconds remaining (Matthew Felix)

■ The maximum score on the 'Cleopactra' stage has already been achieved, but this time trial record is up for grabs, after Tom Duncan's original 2008 record was broken in 2018.

PAC-MAN 256

FORMAT
PlayStation 4

SCORE
155,875 (Marc Cohen)

■ This game is available on a variety of formats, but the version on Sony's console is the most contested. Marc set his record in October 2016, just days after the previous holder.

11 AUG 2009
David Race submits his first perfect run to Twin Galaxies. He does another under Turbo settings in December.

14 OCT 2009
Chris Ayra's fastest completion record is broken by Rick Fothergill, who finishes a perfect game in 3:35:43.

22 MAY 2013
David Race submits a new perfect game record, beating Rick Fothergill by almost seven minutes with 3:28:49.

15-17 NOV 2013
David Cruz completes a perfect game during the weekend of the Kong Off 3, while Twin Galaxies is offline.

13 DEC 2013
Jeff Pickles earns a perfect score using the Turbo speed rules, rather than the standard speed of most records.

2 SEP 2015
Jon Stoodley submits his perfect run from the Play Expo in Margate, which took place on 22 August 2015.

12 APRIL 2018
Twin Galaxies disqualifies Billy Mitchell from all games after an investigation into a *Donkey Kong* score.

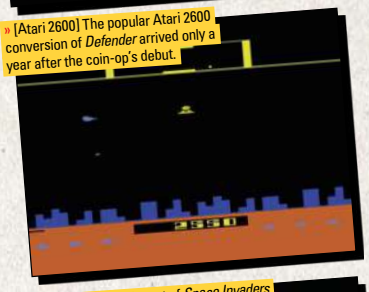
5 JULY 2019
Billy Mitchell achieves another perfect game of *Pac-Man* at Funspot, streamed live on his Twitch channel.

FLASHBACK ATARI 2600

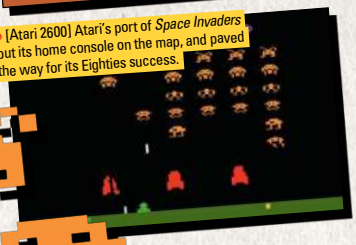
ALTHOUGH IT DEBUTED IN 1977 AND WAS SOLD UNTIL 1992, THE ATARI 2600 WAS VERY MUCH AN EIGHTIES CONSOLE. A BYWORD FOR HOME GAMING PRIOR TO THE US CRASH, THE 2600 SURVIVED, AND CONTINUED TO RECEIVE GREAT GAMES THROUGHOUT THE DECADE

WORDS BY RORY HILNE

» [Atari 2600] *Kaboom!* reinvigorated interest in the Atari 2600's dial-driven paddle controller.



» [Atari 2600] The popular Atari 2600 conversion of *Defender* arrived only a year after the coin-op's debut.



» [Atari 2600] Atari's port of *Space Invaders* put its home console on the map, and paved the way for its Eighties success.

It's fair to say that the Atari 2600 wasn't an overnight success. When it launched in September 1977 as the Atari VCS, the console cost $199 – twice the price of its predecessor, Home Pong. Only nine games were available at launch, Atari was the sole developer for the system, and it planned not to release any further titles until the following year's festive season, and only then if the console was still selling.

By the end of 1979, however, a steady supply of Atari coin-op conversions had led to modest sales of a little over a million machines, and then, in March 1980, the VCS found its killer app. *Space Invaders* not only single-handedly doubled the sales of Atari's home system, but it also made it a must-own product. Later in the year, inspired by the console's growing popularity, four Atari VCS developers left the firm and set up Activision. They released the first third-party games for the system soon after, and although they went down well, Activision's 1981 bomb-defusing action title *Kaboom!* really put the firm on the map when it sold over a million copies.

By the start of 1982, Atari's console had sold an estimated 3.1 million units, but however impressive that was, the best was yet to come. Part of the reason for this uptick in sales was that Activision's success had inspired a number of other companies to develop for the VCS. Key players included Imagic, whose 1982 output included the stylish *Space Invaders* variant *Demon Attack* and innovative fixed-shooter *Atlantis*. Parker Brothers impressed, too, with its *Star Wars* licence, *The Empire Strikes Back*, and coin-op conversion *Frogger*. Coleco, despite having its own console, ported Nintendo's seminal platformer *Donkey Kong* to Atari's home platform, selling over four million cartridges in the process. Activision published the popular shooter *River Raid* in 1982, and the system-defining *Pitfall!*, a best-selling action-adventure with hundreds of levels and satisfying gameplay.

Naturally, Atari heavily supported its now hugely popular console, beginning the year on a high with conversions of the coin-ops *Centipede* and *Pac-Man*, the latter of which shifted an eye-watering 8 million units. Atari's highly original shooter *Yars' Revenge* and its accomplished adaptation of the hit coin-op *Berzerk* followed mid-year. Then just in time for Christmas, it published an action-adventure title based on the wildly popular movie *Raiders Of*

» [Atari 2600] Arcade favourites such as *Frogger* deftly made the jump to the home thanks to faithful conversions.

» [Atari 2600] Despite being trashed critically, Tod Frye's 2600 conversion of *Pac-Man* still sold massively and is fondly remembered today.

» Ad flyers such as this demonstrated the appeal of owning an Atari console in the Eighties.

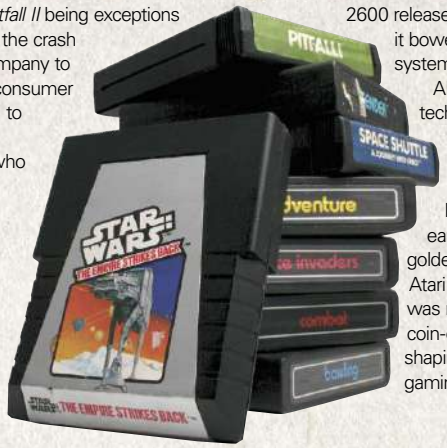
The Lost Ark, a faithful port of the arcade favourite *Defender* and the ill-fated interpretation of Steven Spielberg's *ET The Extra-Terrestrial*.

Atari's festive releases for 1982 appeared just as it renamed the VCS the 2600. By this point, 12 million systems had been sold. It was undoubtedly a high point for the console, but unfortunately, not one that would last.

There were many factors involved in the US videogame crash of 1983, but not least the flood of poor-quality Atari 2600 games that saturated the market in late 1982. The crash caused many developers to close down, and others to stop developing for consoles. Atari's February 1983 release *Ms Pac-Man* was one of its last 2600 titles to sell in the millions, and as the year went by, top third-party publishers' efforts fell far short of this sales mark, with the likes of Activision's frantic platformer *Keystone Cops* and Parker Brothers' fun *Return Of The Jedi* title *Death Star Battle* deserving better fortunes.

By mid-1984, third-party 2600 development had waned, with standout releases like Activision's *H.E.R.O.* and *Pitfall II* being exceptions to the rule. The fallout from the crash convinced Atari's parent company to sell the videogame giant's consumer division, including the 2600, to the founder of Commodore International Jack Tramiel, who temporarily halted all 2600 development.

The only 2600 title of note released in 1985 was Activision's *Ghostbusters* but in 1986, Atari attempted to revive the system at a $50 price point. As part of this effort, it renewed support for the console with a long-running series of titles that included John Palevich's *Gauntlet*-like *Dark Chambers*, and Doug Neubauer's strategic space combat title *Solaris* and jet plane shooter *Radar Lock*. The last of these was Atari's final 2600 release of 1989, the year before it bowed out of publishing for the system altogether.



Although undoubtedly technically impressive, these late-Eighties swan songs are not the games the Atari 2600 is best remembered for. For those, look back to the early Eighties – the console's golden years. This was the Atari 2600's heyday when it was regularly graced with top coin-op conversions, genre-shaping titles and thrilling new gaming experiences. ★

ATARI 2600 ACES

DEFINING ATARI 2600 GAMES FROM THE EIGHTIES

PITFALL!

▶ It's not overstating matters to say that *Pitfall!* set the standard for modern-day platformers. Its 255 single-screen levels feel like an open-world populated with deadly creatures and hazards to run from, jump over or swing past while you search for treasure against the clock.

YARS' REVENGE

▶ The depth of *Yars' Revenge* is matched by its originality. Atari's shooter has you blasting holes in an enemy's shield so you can launch a missile at them. You can hide from return fire in a neutral zone, but when your foe becomes a swirling dervish, your best option is to run.

RIVER RAID

▶ Although it's similar to Konami's *Scramble*, *River Raid* scrolls vertically instead of horizontally and has more confined spaces. Activision's fighter jet shoot-'em-up tasks you with taking out boats, helicopters and bridges, but you have limited fuel and only a few chances to fill up.

THE EMPIRE STRIKES BACK

▶ Parker Brothers' adaptation was peak Atari 2600. It pits you against massive AT-ATs, where tense firefights ensue as you target their heads and torsos while dodging their lasers. In later levels, they deploy smart bombs and move faster towards the base you're defending.

H.E.R.O.

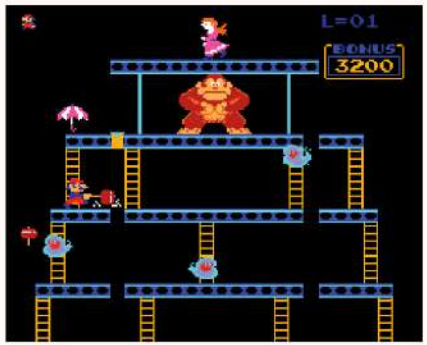
▶ The beauty of *H.E.R.O.* is that it plays to the 2600's strengths. Its rescue mission takes place in sparse yet stylish caves that are navigated using a helicopter backpack. You use dynamite to clear obstacles and lasers to blast foes, all while avoiding choppy waters and lava.

© Getty

Donkey Kong fact

■ Mario can stop barrels rolling down ladders on the red cabinet versions of *Donkey Kong* if he sticks his hand over the top-most rung.

STANDOUT MOMENT **It's Hammer Time**



Donkey Kong looks easy, but it's anything but. The increasing number of barrels that are thrown at Mario by the titular gorilla soon begin to fill the screen and it's all too easy to get taken out by a stray barrel or fireball. Sure, Mario can jump like the best of them, but jumping only gets you so far and sometimes a poorly timed leap will spell your doom. Thank goodness, then, for the hammer that appears on certain levels and grants Mario the power to destroy anything that gets in his way.

Donkey Kong

» **DEVELOPER:** Nintendo » **YEAR:** 1981 » **COST TODAY:** £1,000+

Few arcade cabinets exemplify their contents as well as Nintendo's *Donkey Kong* does. The beautifully bespoke cabinet not only uses thematic artwork to hint at the game's gameplay but also has bright primary colours that match its cartoon-like visuals.

Several variations of the machine exist, including a particularly desirable cocktail cabinet and dinky cabaret versions, but we're focusing on the original standard 'vanilla' upright version (interesting fact, the blue-coloured cabs available are actually a later version of the game).

Continually rising in price (get ready to pay well over £1,000 if you want one) *Donkey Kong* is arguably one of the most coveted cabinets that we've featured in an Arcade Perfect spotlight, and it's desirable for a variety of reasons. It's important from a historical point of view as it's the game that helped change Nintendo's fortunes in the industry, it's the first game to feature Mario and it has one of the most hotly contested high scores of all time.

And let's not forget it's a fantastic game in its own right, thanks to excellent level design, tight and responsive controls and the sort of addictive gameplay that always drags you back for one more go.

INSIDE THE commod

The C64 was born to play games. Albert Charpentier and Yash Terakura tell us how custom chips intended for a games console powered the beloved Eighties computer

Words by Rory Milne

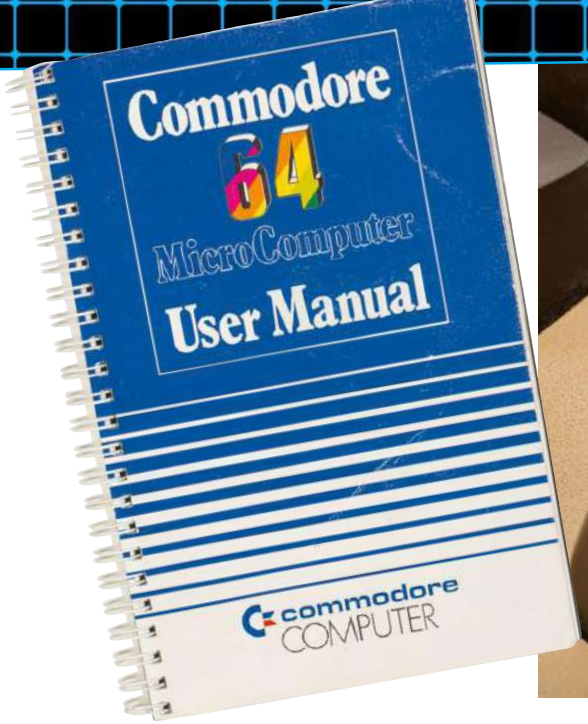
ore 64

» The controller ports on the Commodore 64 accept both joysticks and mice.

» This port allows you to place cartridges in your Commodore 64, such as the Final Cartridge III.

The story of the C64 is fundamentally one of two innovative chips created in 1981 at the Pennsylvania-based Commodore subsidiary, MOS Technology. But the system's success was secured by a third chip and a leap of faith on falling memory prices, and the machine's dominance was ensured by Commodore boss Jack Tramiel obsessing over its cost and insisting on a quality keyboard sourced through his Japanese operation.

The Commodore 64's well-received predecessor, the VIC-20, had been delivered thanks to a similar balancing of cost and quality. MOS engineering manager Albert Charpentier was responsible for designing the VIC-20's video chip, which had first been pitched to console manufacturers. Albert planned to have another crack at the console market with a better graphics chip. "The VIC chip was done, so I started to work on the VIC-II chip," he begins. "The original premise of the chip was, 'Okay, the VIC was good, but it wasn't good enough to entice the game community to buy into it.' We looked at different arcade games from Taito, Konami and Atari. We looked at the features those games had so that at least we would be able to imitate arcade graphics with the VIC-II. Processors back then weren't as capable as they are today. It was a struggle to smoothly move things across the screen, so that's where we put in what we called the 'sprite concept' so you could simply define the character, put in an X and Y coordinate, and it would appear wherever you wanted it. So it really supported the processor so that you could smoothly move objects around the screen." ▶



» The C64's function keys are typically used for controlling a program or activating often-used routines.

> **"We put two joystick ports on for two-player games. Even though it was a computer I still wanted it to be a good games machine!"**
> Albert Charpentier

As Albert devised his custom graphics chip, MOS engineer Bob Yannes developed a complementary sound chip, the 'SID', which was inspired by synthesiser keyboards rather than computer audio chips. "Bob was really fascinated with music – his passion was audio," says Albert. "The VIC had some audio capability, but it was very minimal. Bob said, 'Why don't we make a full three or four-voice chip that has all the fundamentals of a synthesiser keyboard?' So we essentially copied a lot of the things that were done in those keyboards; we didn't look at audio chips from our competitors."

But Albert and Bob still needed to get the go-ahead from Jack Tramiel to develop their respective chips, which they secured with the support of Charles Winterble. "Charles Winterble was a product engineer, who was hired to get a better [chip] yield, we worked pretty closely together," continues Albert. "Charlie, Bob and myself presented the VIC-II and SID concept to Jack, [we said]: 'This is the next generation.' Our pitch was a really good games console. Jack said: 'Go ahead and work with the two chips. We will see what happens.'"

Just months later, however, impressive sales of the VIC-20 saw the pair switch from games console design to home computer development. "Within six months, everyone saw it was going to be a computer. It was clear that the VIC-20 was a wonderful success – it sold, I think, close to a million units. So we said: 'Rather than doing a game console let's make this a better VIC-20.' So it would have better features. We looked at the whole memory management issue and things like that to make a more effective computer. The graphics were still a key part; it was going to be a home computer so it had to have entertainment features."

The sound chip that Bob Yannes was working on was just as important to the entertainment credentials of the VIC-20's successor – although its advanced nature was causing a few headaches. "It was the first time something like that had been done on a chip", explains Albert. "It was really hard to get filters and frequencies and try to create a true synthesiser. It was going to be a four-voice synthesiser, but the chip was too big and we had to cut it down to three."

Thanks to Jack Tramiel's keen eye for market trends, Albert next found himself reworking a variant of the 6502 processor used in the VIC-20 so that its successor could handle more memory. "Jack would come in once a month and we'd give him a report. 64K RAM chips were just becoming available, and Jack said: 'Listen, put 64K into it. Everyone is going to be producing that RAM, it's ▶

SID MAESTROS The six musicians who made the C64 sing

ROB HUBBARD
MEMORABLE GAME: *Master Of Magic*

■ At times, the arrangements of Rob Hubbard's SID compositions make them sound almost orchestral, although quite how this is possible given just three synthesiser voices to work with remains a mystery. Rob's *Master Of Magic* score spans multiple musical styles and techniques to great effect.

BEN DAGLISH
MEMORABLE GAME: *The Last Ninja*

■ Preferring to freelance rather than work in-house, Ben Daglish was nothing if not prolific during his C64 days. Ben produced over a hundred SID tunes, which typically get described as 'feel-good', but his often-understated work on *The Last Ninja* proves this to be something of a generalisation.

MARTIN GALWAY
MEMORABLE GAME: *Wizball*

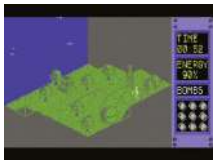
■ Likely remembered as much for the amazing sounds he coaxed out of the SID chip as for his compositions, there's no doubting that Martin Galway made the C64 sing. Martin's *Wizball* title tune sees the C64 rock out to the synthesised strains of a weeping guitar with keyboard accompaniment.

JONATHAN DUNN
MEMORABLE GAME: *Platoon*

■ A late arrival to the professional SID music scene, Jonathan Dunn took over from Martin Galway when he left Ocean Software in 1987. Jonathan's first gig at Ocean was side-scroller *Platoon*, for which he created a memorably atmospheric title tune. His body of work has a distinctive, clean sound.

DAVE WHITTAKER
MEMORABLE GAME: *Glider Rider*

■ Perhaps the busiest of all SID musicians; Dave has gone on record to say that he has wrote tunes for over 400 C64 games. Dave's SID tunes have a uniquely 'electronic' sound reminiscent of the music that pervaded the pop charts of the Eighties and typified by his upbeat *Glider Rider* title music.



MATT GRAY
MEMORABLE GAME: *Last Ninja 2*

■ Like Jonathan Dunn, Matt Gray arrived late to the SID tune party in 1987, but he made up for lost time with epic compositions for the likes of *Driller*. An exclusive contract with System 3 and arguably Matt's finest SID work followed with his *Last Ninja 2* soundtrack – which he finished remastering in 2020.

INSIDE THE COMMODORE 64 The low-down on the C64's key components

CASSETTE PORT

■ Slightly redundant in the US where the preference was for disk drives, the C64's cassette port was essential in the UK where cassettes were the primary storage format for games.

RF MODULATOR

■ Although the C64 has a video port that supports compatible monitors, thanks to its RF modulator, the system also offers the cheaper option of using a TV set as a means of display.

VIDEO CHIP

■ The multi-coloured sprites that define C64 gaming are produced and managed by the VIC-II. Albert Charpentier designed this custom graphics chip to emulate arcade visuals in the home.

RAM

■ Typically filled to its 64K capacity when in the hands of a seasoned games developer, the C64's RAM is best thought of as a largely empty space used to load software into.

ROM

■ Essentially the C64's permanent storage space, in gaming terms, the ROM stores the BASIC language used to load games and the font used to display commands like 'LOAD' and 'RUN'.

SOUND CHIP

■ Inspired by synthesiser keyboards rather than the computer sound chips that had come before it, the C64's revolutionary SID chip was given three 'voices' by its creator Bob Yannes.

CPU

■ The 6510 CPU puts the '64' in C64. Unlike the Spectrum or BBC's CPUs, the 6510 can manage 64K of RAM by disabling access to BASIC and everything else stored in the C64's ROM.

CONTROL PORTS

■ Technically for all sorts of peripherals, the C64's twin control ports were designed for two joysticks and the two-player gaming that would allow. The ports also support mice and paddles.

» At the time of writing, Albert was involved in developing electronic devices for the renewable energy market.

» The AV Jack is on the left, while the serial port on the right handles devices such as printers and disk drives.

▶ going to get very cheap and it would be a great marketing position.' The 6502 could only address 64K, and that had to be ROM, RAM, video stuff and so forth. So that started the design of the 6510 where you could bank-switch pieces of memory around [to] access the hidden 32K of RAM underneath the ROM."

Of course, three custom chips and 64K of RAM don't make a computer, so Albert started on a circuit board to accommodate these and other components. As more engineers joined the project, their prototype became known as the VIC-40. "It was the VIC-40 initially because the VIC-20 had 20 characters on the screen versus the VIC-40 which was going to have 40 characters, " Albert continues. "The VIC-II chip was done, but Bob was still working on the SID. So I started working on the PCB and getting the schematics and everything ready for that. When Bob finished up the SID he started working with Bob Russell to put together the final touches on the architecture and work up the software. Dave Ziembicki was the technician. Bob Russell basically took the VIC-20 software and remade it for the VIC-40. We put the two joystick ports on for two-player games. I loved games – so even though it was going to be a computer I still wanted it to be a good games machine!"

Good progress was being made, but a decision by Jack Tramiel in late 1981 would see Albert and his engineers working around the clock to finish the VIC-40 by the new year. "Jack really wanted us to have something at the January CES in 1982. We worked like maniacs. The SID chip was a little bit behind schedule, but Bob Yannes was killing it and Bob Russell was trying to get the software done. Marketing did not learn about the VIC-40 until probably November. I think Jack was worried that they would get excited about this new product and not focus on selling the old stuff. I got the first silicon right before Christmas and then I found a bug in the video chip that wouldn't allow the sprites to smoothly move over the background. They had to redo the masks and run the entire chip through the process in the [chip] fab downstairs. They did that over the Christmas vacation. They got us the chip around the first of the year. We carved up a VIC-20 case to fit everything in and painted it up – it was insane!"

By the January 1982 CES, the VIC-40's name had changed and Jack Tramiel had received a demonstration of the 'C64' and approved its presentation at the show. "I think that Jack understood that if the presentation was mediocre, you would never be able to win back that excitement. If the demonstration software wasn't right, he would have probably pulled it from the show. I liked the name change since it distanced it from the VIC-20 – the C64 was going to be so far superior. I remember that CES very well – it was a whirlwind! We were introducing this product that we had just spent 18 months developing, and it was just fantastic. We showed two things. I remember one side of the booth was showing the C64 doing computer-like

» As you'd expect, this lights up when your Commodore 64 is turned on. Don't accidentally unplug it!

C64 COMPARISON CHART

The key stats of the C64 and its UK competition

	C64	Spectrum 48K	BBC Micro	Amstrad CPC
UK Launch Date	September 1982	April 1982	December 1981	June 1984
UK Launch Price	£350	£175	£335	£249 (with green screen monitor)
Processor	6510 @ 0.985 MHz	Z80A @ 3.5 MHz	6502 @ 2 MHz	Z80A @ 4 MHz
RAM	64 KB	48 KB	32 KB	64 KB
Display modes	320x200, 160x200	256x192	160x256, 320x200, 320x256, 480x500, 640x200, 640x256	160x200, 320x200, 640x200
Colours	16	8	8	16
Sound	3-channel synthesiser	Internal speaker	3-channel sound chip	4-channel sound chip
Keyboard	Typewriter	Membrane	Typewriter	Typewriter
Joystick Ports	2	0	2	1

» The Commodore 64's keyboard is pleasingly chunky and very sturdy. Ours still works today.

» Numerous games and applications were released for the Commodore's disk drive peripheral.

"There was a lot of pressure to get [the C64] out because clearly the VIC-20 stopped selling once people knew that it was coming"

Albert Charpentier

stuff and the other side of the booth had a couple of C64s doing games stuff. I remember that it was being described as: 'A computer that can play great games.' When Jack saw the level of excitement that's when he went: 'Okay, we're going full-board for this thing.'"

Following CES, Albert's small team became the nucleus of an industrious company-wide effort to get the C64 into production. "Basically, the team was expanded; we got a lot of help from the manufacturing team in Santa Clara. Yash Terakura was very important in that role. He was moving [the C64] out of the lab – out of the prototype – and getting it into manufacturing in Japan. Charlie Winterble was running with our designs and working with the rest of the company so that we could manufacture it. Charlie was essentially a project manager for the whole thing. Commodore had a PCB line in Santa Clara where the C64s were built initially. I stayed up there for a few weeks while they brought it up and started making it in volume. Bob Yannes was with me on that as well. Bob Russell was responsible for migrating the software from the VIC-20 over to the C64. Details all had to be worked out now that we weren't just building one of them, we had to build a million of them."

As part of its production process, the C64 received a distinctive brown case, which Albert recalls as being an expedient design choice. "Yash Terakura took my PC board – that went right into manufacturing. Yash was involved in putting it in the case. He did work at the periphery during the PCB development, but his job was mainly to get the whole thing moving into Japan because the higher volume of manufacturing cases was all in Japan. The VIC-II video chip got pretty hot, so when we put it in, we had a little foot that came down and touched on the chip – this would act as a heat sink. That became part of the FCC shield. The only case that was available that we could actually use was the VIC-20 case, so we modified that. We had to go quickly, and it was available and the right size. We essentially gutted the inside, but the outside was pretty much the same."

The Japanese-born, US-educated Yash Terakura has memories of working on the C64 in both countries – first with Albert's team and then managing the production of the C64's case and keyboard in the east. "I moved to the US to help finish the final production model C64. I helped lay out the PCB, locate and approve parts, and do testing," he remembers. "I was handling all aspects of C64 engineering between the US and Japan. The housing was made based on the production PCB. The mould was the same as the VIC-20 – just with a simple colour change – and it was done in Hong Kong, but the injection was done in Japan. I worked with a design engineer in Japan, Mr Nishimura, on details such as ventilation and the locations of the input/output ports. Mitsumi was the [keyboard] supplier; we used the [VIC-20] keyboard."

Although he didn't have a hands-on role in the production of the C64, Jack Tramiel managed its costs and curbed Albert's desire for more expensive parts. "I remember working with [Jack]; he'd come in every two weeks or so and we'd go over the bill," recalls Albert. "It was always a fight because I wanted to put a better quality something in. He went through every penny on that bill. He was figuring on making millions, and I remember him saying to me: 'It's a million pennies, if you don't want a million pennies I'll take [them]!'"

In keeping with Jack's cost-conscious approach was a fateful marketing decision that forced Albert to pair the C64 with a slow disk drive. "[Marketing] decided to use the VIC-20 disk drive. [There was] a whole warehouse full and they were slower than hell! Right towards the end, we were forced to put on an interface for these drives so that they could sell them off. We wanted a higher speed drive but got shot down on that one."

Albert's recollections of the final stages of the C64's production are of the pressure to get the system released and the elation that followed. "There was a lot of pressure to get it out because clearly, the VIC-20 stopped selling once people knew that it was coming. But we had a lot more resources by then so it was just that everything had to come together. I think the C64 finally got into production in May [1982.] I felt wonderful! I mean, you spend a couple of years of your life bringing something together that you dreamed about that has finally reached a point of reality – and people liked it!"

When asked to look back at the C64, Yash Terakura offers a succinct and humble analysis of the system. "The design was pretty much limited to the availability of electronic parts; we had to design with what we had and we had to make it cheap. It was fun designing a computer in the old days. I can safely say that I did my best at that time."

Albert Charpentier's final words on the C64 are to give credit to the late, and great, Jack Tramiel and reflect on the millions that the system defined home computing for. "Jack Tramiel simply gave us free rein to do whatever we needed to do, and we executed. I give Jack a lot of credit; he gave us that target price, which we had to hit. It was he who had the guts to say 64K. He felt he could still hit the price point that we needed to hit, which is obviously why we were fighting over pennies every day. The C64 just took the world by storm at that price. I really feel that it introduced so many people to computers that may not otherwise have been introduced to them as quickly as they were." *

Thanks to Albert and Yash for telling the story of the C64.

» An essential device for anyone that loves playing games.

CRACK THE SC

CRACKING GAMES IS A DANGEROUS PASSION, BUT ONE THAT CAN CHANGE YOUR LIFE. SCENE MEMBERS RECALL THEIR EXPERIENCES WORKING BEHIND THE CURTAINS IN THE EIGHTIES AND NINETIES, RISKING JAIL TIME TO COMPETE AT WHO WAS THE FASTEST AT CRACKING

WORDS BY DAMIANO GERLI

Back in the Eighties, many would buy a new game after reading about it in mags like *Crash* or *Zzap!64*. But that was not all: perhaps you called your friend to swap floppies. Or you visited your favourite BBS to check what new games were available. It wasn't all fun, though. Groups such as Razor 1911, Fairlight, Paradox and THG were infamous for cracking games on the C64, Amiga and PC, often on the very same day of release. They were working day and night, risking jail to crack games.

Except for later endeavours such as Twilight or Crazy Bytes, in the Eighties and early Nineties groups were working only for the thrill and fun of the challenge. The first cracked games began appearing in the early Eighties, often signed with the nickname of the 'artist'. Soon, crackers began to work together in groups, since that made it easier to access original releases and find people who could get the job done as quickly as possible.

"Sometimes, it was about the quality of a release, but most times it was all about being the first to release a cracked game," remembers Pontus Berg, an early member of Fairlight. Pontus lived in a small city outside Lund, Sweden. In the early Eighties, it was not easy for him to access new releases of Commodore 64 games. "The first time I played a cracked game, I saw that it bore a signature and that made me want to join too," Pontus says, mentioning a friend of a friend who already had his own cracking group that he soon joined. "I really wanted to see how the code of a game worked. I dedicated all my waking hours to it: reading books, looking at machine code monitors. It was my full-on passion."

Pontus joined Fairlight in late 1988, mentioning it as a lucky break, as there wasn't much competition on the scene. "I was still getting originals via post, sending them back after cracking. Before the BBS, we tried to crunch files as much as possible in order to fit the content of a disk on tape. But that changed with the arrival of the modem and the BBS, after that, the scene grew pretty fast." He comments how, in a way, the pyramid grew under his feet during his time at Fairlight.

Cracking a Commodore 64 game took, on average, up to eight hours, mostly because of the long time to crunch the file. "Today? I could do it in 40 minutes!" laughs Pontus. Among the many games he hacked on C64, he specifically mentions *Alternate Reality: The Dungeon*. He spent 11 months on it, while the community also got together to complete a full-on strategy guide, which greatly improved on the original documentation in the game's box.

One of the founders of Razor 1911, Sector 9, mentions growing up in Norway and how easy it was to get pirated games "as early as 1983, as long as one had a Datasette, you could get as many games as you wanted". He mentions starting cracking games in 1985, learning a bit of assembler, then founding Razor 1911 in October of the same year. The group started as a demogroup, developing music and graphics, since, as he mentions, "We didn't have access to any original games, so we couldn't release anything that anybody had not released first. Our first cracked games were only released in late 1989 on the Amiga." Often, cracked games came with a graphical intro or demo, called cracktros, often not developed by the crackers. Sector 9 mentions, as an organiser for Razor, how they were his responsibility, "I

» [C64] The Fairlight cracktro for *International Karate* on the Commodore 64

© Getty

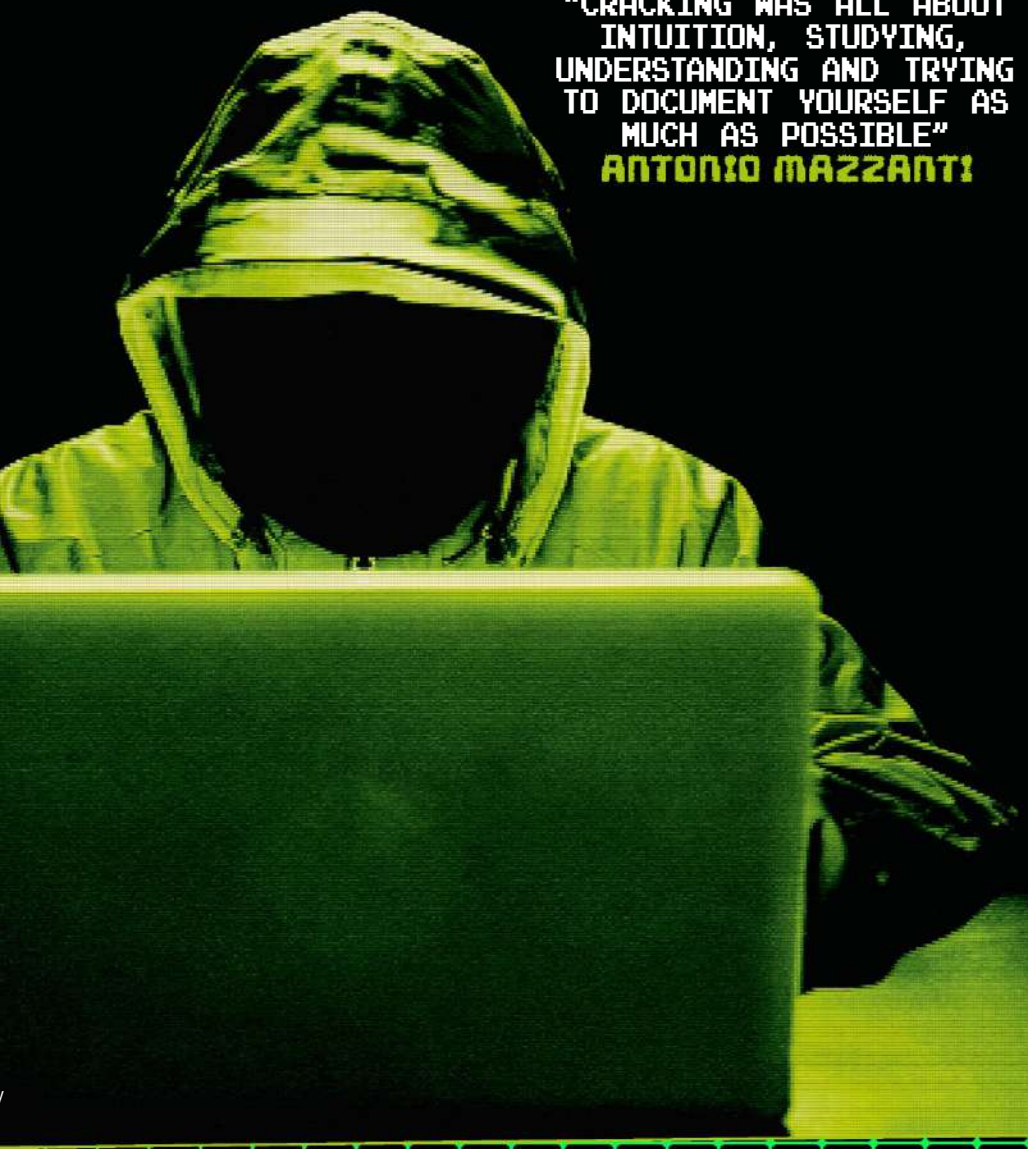
ING ENE

» [Amiga] *Dungeon Master* was a notoriously difficult game to crack on the Amiga.

» Antonio at his PC desk (1993) on the phone with his trusty US Robotics HST modem.

» A Razor 1911 dinner: Sector 9 is on the right, Antonio on the sofa.

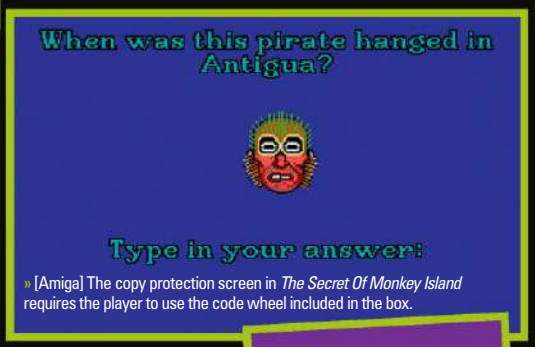
"CRACKING WAS ALL ABOUT INTUITION, STUDYING, UNDERSTANDING AND TRYING TO DOCUMENT YOURSELF AS MUCH AS POSSIBLE"
ANTONIO MAZZANTI



made graphics and code for cracking intros which were released with the games, and for demos that were released on their own."

Groups tended to function with a full-on hierarchy, between organisers, suppliers and couriers. An organiser would plan and co-ordinate the transfer of uncracked games from the suppliers to the crackers, then pass them on to the team of members (couriers) who in turn would distribute the game to BBSs around the world. "As organisers, we would also try to shield the crackers from too much external interference" Sector 9 says. "Not only did they need to be able to do their crucial job in peace, but also some of them did not really want to take part in the fast-paced cracking scene."

Pontus mentions that with the arrival of the Amiga, cracking games became much more complicated, with the work taking more hours and technical skills. In 1994 he would leave the scene, after starting to study law and getting married. Around the mid-Nineties, the scene started to change, with many groups starting to jump ship to consoles such as the Mega Drive and Super Nintendo as well as the PC. Antonio Mazzanti, working under the pseudonym Randall Flagg, mentions joining Razor in late 1992, "I was ▶



» [Amiga] The copy protection screen in *The Secret Of Monkey Island* requires the player to use the code wheel included in the box.

» [Amiga] *Monkey Island 2* also included a copy protection similar to the one in the previous game in the series.

» [Amiga] *Alternate Reality* took Pontus a year to fully crack.

» [Amiga] *I Play 3D Soccer* featured a notoriously hard to crack protection system.

the first ever to work on the PC scene since no one else was doing it at the time. I worked with them for two years, then went on to join Eclipse then Hybrid."

Antonio recalls it all started with *Maniac Mansion*. "Back then, around 1989, no one was cracking LucasArts games, so we were forced to photocopy manuals to play them. It did not take long to decide I would start specialising myself on LucasArts' titles. It took me a full year to crack *Maniac Mansion*." But it would be his work on I*ndiana Jones And The Fate Of Atlantis* that would get him an invitation to join Razor from the head honcho.

One of Antonio's biggest achievements in his cracking career is another LucasArts classic: *Day Of The Tentacle*. "They introduced several modifications to SCUMM. Basically, you had to forget everything you knew and start from scratch. A group had faked a release, uploading a version that did not work, hoping that the cracker would finish it before people started playing. But I was the one to, so to speak, crack the case." Antonio also mentions a tender moment when, years later, he met David Fox and received forgiveness for his early work on *Maniac Mansion*.

Antonio speaks of a generally friendly competition in the scene in the mid-Nineties. "After we finished our job, we would create instructions for the game, in the so-called nfo file, then the release would be shared on the main BBS of Razor. The timestamp of uploading the release was essential in deciding who won the race." That is why the games were assigned based on experience, with most releases being generally simple to crack, while the more complicated ones went to the expert crackers. Antonio mentions how games on PC never really used to have graphical intros, like they used to on Amiga, since programming was much more complicated on a PC. "There was too much in-fighting to get the release out first, most times we did not even have time to program a demo," he comments.

Despite the scene being made mostly of shy programmers, they would often meet in person. The first gatherings in the mid-Eighties were called copy parties and started in Germany and The Netherlands.

» [Amiga] A still from *Voyage*, Razor 1911's Amiga demo.

» [PlayStation] A still from a PlayStation Paradox cracktro.

NOTORIOUS CRACKING

RAZOR 1911

■ Founded in Norway in 1986 by Doctor No, Insane TTM and Sector 9, the group was at first a demogroup only, beginning to release cracked games in late-1986. The group also ran the disk mag *Propaganda* until 1995.

FAIRLIGHT

■ Strider and Black Shadow founded Fairlight in Sweden in 1987, after leaving WCC (West Coast Crackers). Strider had managed to bribe a train conductor to bring Commodore 64 games to his fellow member to crack them. Fairlight became the first group to release games on Super Nintendo.

PARADOX

■ Founded in 1989 by Danish and French members of the hacking scene, Paradox worked for two years on the Amiga Scene. It was later disbanded and in 1994 it started cracking Sega Mega Drive titles. Paradox was the first to crack, in 2020, the notoriously difficult Denuvo protection.

» [Amiga] *RoboCop 3* on Amiga was famously sold with an expensive dongle which had to be plugged in to make the game work.

» [Amiga] Here's the intro for *AD&D: Ravenloft* that Antonio cracked under his Randall Flagg pseudonym.

These were invite-only parties strictly for members of established demo and cracking groups. Sector 9 tells us, "During these gatherings, groups would compete in making music, graphics, demos or cracking games. The gatherings gradually spread to the rest of western Europe and by the mid-Nineties they had become law-abiding mega-events such as Assembly or The Gathering with thousands of people attending annually."

> "IT WAS NEVER FOR THE MONEY, BUT THE KNOWLEDGE TO BE PART OF SOMETHING"
> SECTOR 9

While, in Europe, governments often ignored the problem, legal risk was still a problem. In the late Nineties, police operations specifically made to crack down on groups were organised. Operation Fastlink, created by the US government, was specifically to take down Fairlight. Sector 9, recalls narrowly avoiding a police raid only because he had moved away ten days before, "This went down in 1993, I never went back working with Razor full time after that."

Despite the scene and the technology changing over the years, everyone seems to agree on one thing: how the scene really changed their lives. Sector 9 mentions how he was surprised by how loyal people were to an idea he had at 14 years old. "It still amazes me how much money, energy and effort people would want to devote just to have a name and feel as part of a community. It was never for money, but the knowledge to be part of something."

Pontus Berg currently manages the Fairlight YouTube channel, interviewing members of the scene. "After 1994, I became sober for a while, then I came back. I believe cracking is an educational and interesting hobby. While there is still competition on who can crack a game first, it is also important to develop the best crack around. Also, the social aspect: being part of a community and meeting all the people I worked with in the years in the scene."

Antonio also agrees, saying, "It was like competing for who had the biggest ego of all. There was no information sharing, while today it's quite easier to find info, back then if someone knew a way to more efficiently crack something, they would keep it a secret. Even between team members little info actually circulated. It was all about intuition, studying, understanding and documents." He concludes with a note of sadness, "It was a fantastic world that will never be again." ★

HARD NUTS TO CRACK

SOME GAMES USED SYSTEMS WHICH MADE THEM HARD TO CRACK

Despite games generally using similar copy protection methods, in the Eighties and early Nineties there were several games with unique protections. Among these was *I Play 3D Soccer*, by Italian studio Simulmondo, which featured its copy-protection method in the starting menu. If one removed it, the game had several protection checks, which, if failed, would make later matches in the game unwinnable. The Amiga version of *Hook*, after the initial protection check, had another one later, hidden in the code, which would cause a key item to disappear from the game. *RoboCop 3* used an expensive dongle that had to be plugged in the second joystick port. Crackers hacked it pretty fast, so that players were unhappily paying more for a game only because of its complicated protection system. Most famously, *Dungeon Master* on Amiga featured several checks, such as fuzzy bits on disk sectors, which change each time they are read. If the game does not detect the fuzzy bits, it would stop the player before entering the dungeon. Additional anti-piracy checks exist in the code, including checksums and code hidden as images in the graphics file. While these checks did not prevent the game from working, they would significantly slow down progress for the player.

GROUPS

THE MOST ACTIVE GROUPS IN THE EIGHTIES AND NINETIES

THG (THE HUMBLE GUYS)

■ One of the first PC-specific groups in the early Eighties, THG also created the nfo description file as a standard. It was also the first group to develop animated and graphical intros for the PC scene.

TDT (THE DREAM TEAM)

■ The Dream Team was a group mainly dedicated to PC, formed in the Netherlands in 1989 and active until 1996. In its (relatively) short history it managed to crack a notable number of games, such as *Simon The Sorcerer*, *Ultima Serpent Isle* and *Speedball 2: Brutal Deluxe*.

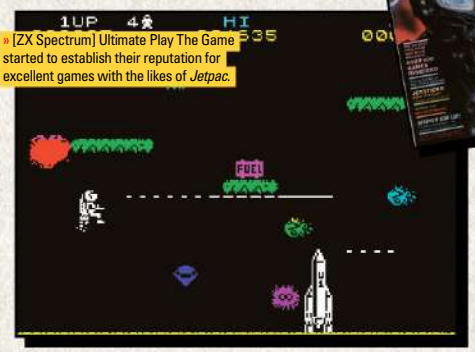
FLASHBACK

HOME COMPUTER HEAVEN

FROM THE EARLY EIGHTIES, HOME COMPUTERS DOMINATED THE UK GAMES MARKET, AND THEY CONQUERED THE US SOON AFTER. ALTHOUGH CODERS INITIALLY FAVOURED COIN-OP CLONES, THEY LATER GRACED THE DECADE WITH SOME OF ITS MOST ORIGINAL GAMES

WORDS BY RORY HILNE

The first three computers aimed at the consumer market were launched in 1977, and each was capable of running videogames. The problem was that they hadn't been designed as gaming platforms; the Commodore PET and TRS-80 were monochrome, text-based systems with rudimentary graphics capabilities, and while the Apple II could depict colour, this was reflected in its $1,298 price tag. By comparison, Atari's VCS launched the same year and sold for $190, and it was made for games, making it a far better option, at least in the US.



» [ZX Spectrum] Ultimate Play The Game started to establish their reputation for excellent games with the likes of *Jetpac*.

In the late Seventies, imported home computers and consoles were prohibitively expensive in the UK, but in early-1980 a cheaper alternative appeared. The British-made no-frills ZX80 cost £99.95, and soon thousands of owners were playing unauthorised arcade conversions and original gaming concepts on it. It was succeeded by an even less costly successor the following year – the ZX81, which soon built up an impressively large library of coin-op clones, text adventures and other gaming fare. However, rather than being developed by big companies with money behind them, these home-grown titles were more typically produced and distributed by solo developers working from home.

By March 1982, 250,000 ZX81s had been sold, and its producer Sinclair Research had announced the launch of a new home computer the following month, which unlike its predecessors had colour and sound. Where the ZX80 and ZX81 had been more attractive to UK gamers than US consoles and home computers due to their low cost, Sinclair's new model, the ZX Spectrum, could also hold its own in terms of the quality of games that it could support. Additionally, it was available to order before the UK release of a hot new US home computer, the Commodore 64, and it cost £175 where the C64 had a £399 price point.

» The BBC Micro from Acorn Computers was an unlikely champion for home computer gaming during the Eighties.

The affordability and the suitability of the Spectrum for playing games effectively made it the de facto gaming platform in the UK throughout 1983. Notable Spectrum releases for the year included Ultimate's intense space shooter *Jetpac* and its frantic castle crawler *Atic Atac*. Matthew Smith's surreal platformer *Manic Miner* was equally worthy of praise, as was Sandy White's isometric rescue mission *Ant Attack*. The C64 was less well supported by Britain's bedroom

HOME COMPUTER CLASSICS

DEFINING HOME COMPUTER GAMES OF THE EIGHTIES

MANIC MINER

One of the first hit home computer games to favour originality over paying homage to the arcades, Matthew Smith's platformer is a work of inspired madness. Its simple premise involves the tricky task of collecting keys to trigger exits while avoiding all manner of strange foes.

KNIGHT LORE

Ultimate's early attempt at depicting a 3D world was a revelation on its release. Continuing the adventures of Sabreman, *Knight Lore* challenges players to interact with their environment and find items, with the overall goal being to drop them into a wizard's cauldron.

URIDIUM

Although it reinvigorated the shoot-'em-up, *Uridium* is as much an obstacle course as it is a shooter. Replete with homing mines, enemy ships and landing strip level exits, Andrew Braybrook's side-scrolling masterpiece gives you too much speed and tasks you with using restraint.

THE LAST NINJA

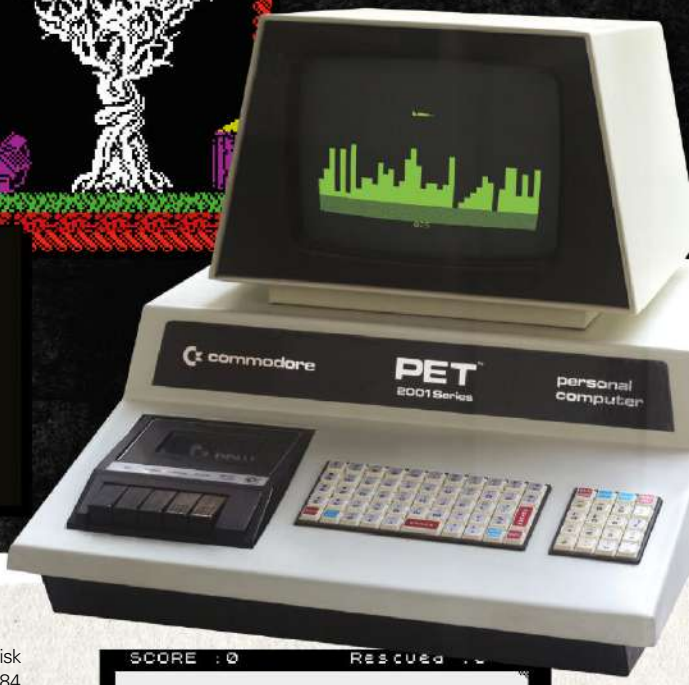
A clever fusion of an arcade adventure and a beat-'em-up, *The Last Ninja* also impresses with its beautiful environment and atmospheric soundtrack. As well as finding objects to overcome obstacles, it sets physical challenges, such as crossing rivers by leaping from rock to rock.

ROBOCOP

The best-selling UK home computer game of the Eighties, *RoboCop* fed off the buzz around the movie it was based on while delivering compelling gameplay. Ocean's crowning glory is a rock-hard scrolling shooter, where timing and positioning are just as important as twitch reflexes.

» [ZX Spectrum] The Oliver twins showed gamers that arcade-style game design could translate to a keyboard at home.

» [BBC Micro] Titles like the open-ended space trading sim *Elite* demonstrated what the home computers were capable of.



coders, but a price cut late in the year led to brisk sales, which piqued their interest going into 1984.

Because the Commodore 64 and ZX Spectrum were quite different systems, they were best suited for hosting quite different games. The popularity of the two platforms meant that each received as many unique titles as they did adaptations of games from the other system, and of course, adaptations of titles created for less-popular computers were developed for both machines. British games magazines flourished during this time, and their highly influential reviews provided a form of quality control, which helped bring about 8-bit computer gaming's best years.

It's no exaggeration to say that in terms of advances in gameplay and evolution of gaming genres, the very best home computer games released between 1984 and 1987 represented a high point for the wider games sector. Home computer game development rapidly changed from a cottage industry to big business during this time, which resulted in bigger and better gaming experiences.

In 1984, home computer gamers were treated to the space trading epic *Elite* and the isometric adventure *Knight Lore*. Then in 1985, the sophisticated shoot-'em-up *Paradroid* and the strategic beat-'em-up *Way Of The Exploding Fist* made waves. 1986 saw the superlative shooter *Uridium* appear on the C64 and *The Sentry* grace the BBC Micro, before they were ported to other systems. By 1987, there was a sweet spot, where developers were getting the best out of 8-bit home computers and still had a captive audience, with some highlights being the isometric oddity *Head Over Heels*, the adventure brawler *The Last Ninja* and the multi-layered shoot-'em-up *Wizball*.

» [ZX Spectrum] Stylistic flourishes as seen in titles like *Ant Attack* made deft use of the unique graphic capabilities of the ZX Spectrum.

During these halcyon days of 8-bit home computer gaming, 16-bit successors the Atari ST and Commodore Amiga were launched, although they really didn't come into their own until the very late Eighties. Meanwhile, 8-bit home computer games continued to be released as the decade waned, many of which were budget titles – such as the popular *Dizzy* series of arcade-style adventures.

Home computer gaming continued into the subsequent decade, but it was arguably at its most exciting in the Eighties. There was an explosion of creativity during those magical years, where players were wowed by one original concept after another.

» The Commodore 64 was popular with coders, gamers and tinkerers with sound chips alike.

© Getty

Hardware Heaven

EDITOR'S CHOICE

3D Deathchase

The Spectrum's library is so diverse and expansive that it seems unfair to put one single title forward as the game you should play first. Rules are rules, though, so we're plumping for *3D Deathchase*, one of the greatest games to appear on Sir Clive Sinclair's machine.

The concept of *3D Deathchase* is simple – use your motorcycle to weave through a forest and shoot down two rivals. Shoot both down and you'll move to a night stage and the game becomes that much more difficult. While we can't be sure that everyone pretended to be riding a Speederbike through Endor like we did, we're confident you found it just as mind-blowing to play.

ZX Spectrum fact

■ The Spectrum suffered from numerous unofficial clones that were typically released in former Eastern Bloc countries, as well as the Soviet Union. Notable examples include the ATM Turbo, CIP, Tim-S, HC85 and Pentagon.

RAM: 16 OR 48K
PROCESSOR: Z80A @ 3.5 MHZ
MEDIA: CASSETTE TAPES
AUDIO: INTERNAL SPEAKER
COLOUR: EIGHT
DISPLAY MODE: 256X192

ZX Spectrum

» **MANUFACTURER:** Sinclair Research Ltd » **YEAR:** 1982 » **COST:** £125 (16KB of RAM) £175 (48KB of RAM) Today £75+

There's a reason we relaunched Retro Gamer in December 2005 with a ZX Spectrum on the cover – it's one of the most iconic home computers ever. It might not have managed to compete with the superior sales of the Commodore 64 at the time, and it was arguably more popular in the UK than it was elsewhere in the world, but its failure to crack the huge US market doesn't make it any less loved by those that were lucky enough to own it.

Designed by Rick Dickinson, the ZX Spectrum was the natural evolution of Sinclair's earlier ZX81, offering more memory, more power and more… well, more of everything, really. Its low price point made it instantly attractive to the average consumer that Sinclair was targeting, while the computer's clever BASIC keywords made it extremely popular with budding bedroom coders. It was cheap and cheerful, but the possibilities offered when your fingers connected with that delicate rubber membrane suggested a world of possibilities beyond what was capable with Sinclair's earlier computers. In short, it felt like a revolution and many famous coders went on to create their first games on the system. It's quite simply one of the best-loved machines of its era. ✱

ULTIMATE GUIDE

JET SET

HE'S FEATURED MANY TIMES BEFORE IN RETRO GAMER BEFORE – BUT THERE'S NEVER TOO MANY TIMES FOR THIS ZX SPECTRUM LEGEND, APOCRYPHALLY CALLED 'JET SET FKING WILLY' BY SIR CLIVE SINCLAIR HIMSELF. WELCOME ONCE MORE TO GAMING'S STRANGEST MANSION FOR THE ULTIMATE GUIDE TO JET SET WILLY**

WORDS BY GRAEME MASON

It all begins one sunny day in Surbiton. While out randomly prospecting, Miner Willy discovers an ancient mineshaft. Unable to resist plunging into the abyss, Willy explores caverns full of manic mining robots, deadly spiders and treasures beyond his wildest dreams. After his adventure below ground, he emerges blinking into the sunshine, considerably wealthier than when he entered. Now, Willy could finally abandon his back-breaking career and retire to a luxury mansion by the sea.

This clifftop abode houses all the trappings for a nouveau-riche socialite like Willy. There's a large swimming pool, a luxury yacht, an ornate orangery *and* a conservatory, a huge master bedroom and a well-stocked wine cellar. He has an Italian housekeeper, Maria, a French chef, Andre, and, inevitably, many new friends eager to share in Willy's good fortune. And all of them know how to enjoy themselves.

One night, Willy hosts the party to end all parties. There's drunken revelry and merriment throughout his mansion and beyond, and when the last of the partygoers disappears (in Willy's Aston Martin, to boot), all the erstwhile miner wants to do is fall into his lavish four-poster bed and go to sleep. But there's a problem. Maria's had enough. The mansion is a mess, with strewn glasses and bottles littering virtually every room. The housekeeper uses her imposing form to block Willy's path to his bed. Willy is weary and may have had too much to drink. But there's no rest until he's cleared up every last piece of party detritus.

Jet Set Willy takes place over 60 screens, from the rooms of his crazy mansion to his yacht, the local off-licence and even hell itself. There's no traditional scoring in *Jet Set Willy*: throughout the map are over 80 flashing items, and Willy has to collect all of them before Maria allows him to pass and collapse into his bed. The game begins – appropriately, given its cover – in the bathroom, where Willy has just barfed away some of the previous night's excesses. He ventures dazedly out onto the Top Landing, descending to the First Landing, and onward into some of the weirdest building construction this side of a circus funhouse. Sadly for Willy, his mansion is inhabited by many strange and deadly creatures ▶

> "IT WAS VISUALLY OBVIOUS THAT THERE WERE GAPS IN THE ORIGINAL MAP ONCE THE CARTOGRAPHY ROOM WAS IMPLEMENTED"
> STEVE WETHERILL

» [ZX Spectrum] Pop-culture references pepper *Jet Set Willy*.

WILLY

» [ZX Spectrum] The Banyan Tree. Can you complete this devilishly tricky room?

» [ZX Spectrum] Collect the tap, and off we go!

WILLY VERSUS THE BUGS

MATTHEW SMITH'S OPUS IS NOTORIOUS FOR ITS BUGS. HERE ARE FIVE OF THE BEST/WORST

INACCESSIBLE ITEMS

■ Situated left of Under The Roof, Conservatory Roof houses four items, each guarded by a grinning meanie. Willy cannot reach the platform on the left in Under The Roof that gains entry to this screen due to a death bug that prevents entry from the screen below.

UNOBTAINABLE ITEM

■ Even if you manage to POKE your way into the Conservatory Roof, there's another problem. An enemy closely guards the item on the far right, and Willy transfers to the next screen before he can collect it. Plus, that conveyor belt is actually unfinished.

INVISIBLE – AND UNOBTAINABLE – ITEM

■ The First Landing will be familiar to even the most casual *Jet Set Willy* fans, and it nefariously contains an invisible item. Worse, this item is situated just to the left of the cross, meaning that even if visible, Willy can't collect it.

INFINITE DEATH LOOP

■ This is not so much a bug as it is more of a flawed gameplay mechanic. Willy respawns at the point he enters the screen he just died on. Should that result in death (such as falling), watch in despair as all those spare Willys disappear over and over again.

THE ATTIC BUG

■ The most famous *Jet Set Willy* bug of all. While initially declared as a 'feature' by Software Projects, it eventually admitted the error, releasing a POKE to correct the bug. Should Willy visit The Attic, several rooms become inaccessible due to an errant arrow sprite.

» [ZX Spectrum] *Manic Miner*'s penguins return in *Jet Set Willy*.

» [ZX Spectrum] The Battersea Power Station inspired *Jet Set Willy*'s Emergency Generator room.

» [ZX Spectrum] Just beyond The Beach lays Willy's yacht.

"IF I RECALL CORRECTLY, THERE WAS A DISCUSSION OF THE ATTIC BUG DURING MY INTERVIEW AT SOFTWARE PROJECTS AND HOW IT WOULD BE ADDRESSED"
STEVE WETHERILL

patrolling the floors and platforms of each room. And just what was the previous owner doing in the laboratory before his mysterious disappearance?

As with its predecessor, *Jet Set Willy* is a platform game. Unlike *Manic Miner*, Willy is free to explore his mansion, flicking between screens as he discovers rooms, each more bizarre than the last. There's the Nightmare Room, where Willy transmogrifies into a flying pig-type creature, stalked by apparitions of his housekeeper, Maria; a chaotic roof full of hazards, guards and a Hunchback pastiche; Willy's yacht, which inspired the persistent theory that if you stood on the deck at a specific time, the boat would launch to a deserted island; and of course, the wickedly devised Banyan Tree, the scene of many a lost life for Willy.

Conveyor belts, poisonous plants, stairs and platforms populate the mansion, along with that uncanny menagerie of enemies.

CRACKING EXPLOITS

THE BEST UNOFFICIAL JET SET WILLY GAMES TO TRY

JET SET WILLY 16K BY JONATHAN CAULDWELL

This is a much pared-down version of *Jet Set Willy*, albeit with the same memorable gameplay. There's no sound, fewer enemies and screens, but crucially this makes the game much more accessible, especially for newcomers to the genre. The Banyan Tree is still a pain, however.

MARIA VS SOME BASTARDS BY VIDAR ERIKSEN

This cracking mod from 2003 hugely modifies the original game graphically. There's a roaring fire and a mansion full of fresh meanies, including Willy's arch-enemy, Eugene, from *Manic Miner*. Superb, but be warned: it's just as hard, if not harder, than the original!

JET SET WILLY 5: ZX HEROES BY IGOR MAKOVSKY

This crack uses John Elliott's adapted 128K engine of *Jet Set Willy*, and is a loving homage to the Matthew Smith game and over 30 other ZX Spectrum classics. From *Hen-House Harry* to *Monty Mole* and *Technician Ted*, *ZX Heroes* really does live up to its title.

JET SET WILLY IN PARIS BY HERVÉ AST

Willy jets off to the French capital in this 2005 redesign of the Software Projects game. Each location is inspired by the streets and spirit of Paris, from the Bois De Boulogne to the Montparnasse Tower and, of course, the Eiffel Tower. Its designer thoughtfully included scenes of civil unrest.

HENRY'S HOARD BY MARTYN BROWN

In contrast to the other cracks on this list, Alternative Software commercially released *Henry's Hoard* back in 1985, and it's a 're-imagining' that got away with its high-profile budget release. The experience didn't do designer Martyn Brown any harm: he went on to cofound Team17.

» [ZX Spectrum] Willy ends the game as he starts it, head down the toilet.

» [ZX Spectrum] *Jet Set Willy*'s famous *Python*-esque game over screen.

Matthew Smith's imagination was inspired by events and people in his life, creating a hugely inventive selection of nasties to avoid. From the hyperactive saw to bouncing computer chips, a Swiss Army knife, wobbling jellies and an effigy of Ocean boss David Ward, the sheer craziness of *Jet Set Willy*'s enemies helped endear it to a vast audience, securing its legendary status.

The anticipation for Matthew Smith's next game was stratospheric in the gaming press. But by February 1984, *Jet Set Willy* was still nowhere to be seen. "After a visit to deepest Woolton (Liverpool), we can report that the errant *Jet Set Willy* is alive and well, if a trifle late in emerging from that Surbiton Mine of his," reported *Crash* magazine. Two months later, the sequel finally arrived to universal praise. "To date, one of the most addictive and finest Spectrum games," gushed *Crash*, bestowing the Software Projects game the honour of the first *Crash* Smash. *Computer & Video Games* was equally effusive, reserving particular praise for Matthew Smith's imaginative sprites. "*Jet Set Willy* has well over 60 screens – all different – featuring Matthew's wonderful graphic oddities. Watch out for the ballet-dancing rabbit and the penguins in the cold room. Graphic masterpieces in their own right." Commercial success followed, and *Jet Set Willy* shot to the top of almost every Spectrum game chart. Yet the game wasn't without controversy. ▶

DEVELOPER Q&A

RETRO GAMER CHATS WITH STEVE WETHERILL, ONE HALF OF THE TEAM BEHIND THE AMSTRAD CPC PORT OF JET SET WILLY

What did you think of the original Spectrum game?
I was a big fan. If I recall correctly, there was a discussion of The Attic bug during my interview at Software Projects and how it would be addressed. But my main recollection was that I really could not believe I was interviewing for a job at the company that produced *Jet Set Willy*!

Did you have any source code to work with?
No, and I suppose we'd managed *Manic Miner* without any, so it seemed natural to do the same with *Jet Set Willy*. Derrick [Rowson] and I had a go at fixing the 'Death Loop' bug [where Willy continually falls to his death] – if I recall correctly, we placed you back on the last platform you were standing on. But that led to other death loops as we didn't store the enemy locations then. It was a bit better than the original, but not a complete fix.

Did you and Derrick have specific roles?
No, we just mucked in. Derrick made a room editor and coded the room that allowed us to select and jump to a specific location in the game for testing purposes – the Cartography Room. He was also treated as a more senior programmer: he had a more powerful Tandy TRS-80 Model 4 Computer with a hard disk. But I was happy to pitch in where I could and learned a lot from Derrick. I created many of the additional rooms.

On that subject, at what point was it decided to expand the game?
That's an interesting question – I don't know if a decision was ever made, at least not formally. It was visually obvious that there were gaps in the original map once the Cartography Room was implemented. So, we undertook to fill in those gaps by adding additional rooms.

Is that how the Final Frontier concept started?
Yes, I think it grew organically out of the simple notion that here's a rocket to take you into space – where would it go? Why not the Starship Enterprise? Incidentally, the NCC 1501 room is simply a misremembering of NCC 1701. There was no internet to check such things back then!

Did you have anything to do with the *They Sold A Million* compilation version?
As far as I'm aware, that was created after I departed Software Projects. It probably had something to do with the Spectrum release of *Jet Set Willy 2* – which is obviously a straight version of our Amstrad version of the original, ported back by Derrick.

How satisfied were you with the final game?
It did what it needed to do, and then some. Hopefully, it made Software Projects some money, and that seems likely with the port back to the Spectrum for the *JSW2* release. Most of all, I learned a tremendous amount and will be eternally grateful for the opportunity.

» [Amstrad CPC] Boldy going where no retired miner has gone before.

RENOWNED ROOMS

WE PEEK THROUGH THE KEYHOLE OF FIVE OF JET SET WILLY'S MOST FAMOUS LOCATIONS

THE ATTIC

■ Home of the famous game-breaking bug that lurked inside the original 1984 release of *Jet Set Willy*. It also contains this impressive *Pac-Man* snake-type thing.

THE BANYAN TREE

■ The room that, even today, causes nightmares in middle-aged gamers everywhere. The stumps of this room, coupled with its fast-moving enemies, make this a claustrophobic nightmare.

ENTRANCE TO HADES

■ The product of Matthew Smith's twisted sense of humour, the Entrance To Hades sits under the Security Guard screen. Anyone foolish enough to descend loses all their lives.

THE NIGHTMARE ROOM

■ Few things give Willy worse nightmares than his housekeeper, Maria. In this dangerous room, he transforms into a non-flying flying pig and has to dodge multiple Marias.

THE YACHT

■ Saunter past The Beach, and Willy finds his yacht. Rumours abounded that if you waited long enough, the yacht would set sail and transport its owner to a hidden island.

» [Amstrad CPC] Do you think maybe he's compensating for something?

» [ZX Spectrum] How high up the Megatree can Willy climb?

» [ZX Spectrum] He just wants to go to bed. But Willy's housekeeper, Maria, bars the way.

» [ZX Spectrum] There are bottles galore at the offie.

» [ZX Spectrum] Outside The Bathroom is the Top Landing.

"HOPEFULLY, IT MADE SOFTWARE PROJECTS SOME MONEY, AND THAT SEEMS LIKELY WITH THE PORT BACK TO THE SPECTRUM FOR THE JSW2 RELEASE" STEVE WETHERILL

▶ "Why not join the Jet Set and share in Willy's good fortune," announced Software Projects in *Jet Set Willy*'s cassette inlay. "[We] are offering a prize to the first person to write or telephone our offices in Liverpool with the answer to the question: how many glasses must Willy collect before Maria lets him go to bed?" The impressive prize was a helicopter ride, a case of Dom Pérignon champagne and a chance to meet the game's author – but there was a problem. Due to numerous bugs, Willy couldn't actually collect all the items, at least not without a POKE or two. The worst was the infamous Attic Bug – visiting this location rendered several other rooms death traps thanks to a wayward arrow. Software Projects doubled down, printing an advert that suggested the problem was by design rather than accident. Spectrum gamers weren't having any of it, and when further bugs appeared that made the game impossible to complete, Software Projects belatedly issued a set of POKEs to fix the various problems. The controversy continued: the prize winner could only have known the answer by using their own POKE – effectively cheating.

Colourblind gamers also had cause to be upset. Paranoid over piracy, *Jet Set Willy*'s publisher included a colour-chart copy correction grid. When loaded, the game would demand a four-colour code from a specific location on the closely packed grid. The similarity between red and magenta confused many, while black and white TV owners didn't stand a chance, and should you lose your card, that was it. "Replacement cards will not be issued," stated the instructions sternly.

Nevertheless, the bugs and copy protection added to *Jet Set Willy*'s fame. The game also proved to be Matthew Smith's swan song: the famed author was not involved with semi-sequel *Jet Set Willy II* and promised follow-ups, *Miner Willy Meets The Taxman*, *The Megatree* and *Attack Of The Mutant Zombie Flesh Eating Chickens From Mars*, all failed to appear. Nonetheless, *Jet Set Willy*'s finely tuned level design, its wealth of idiosyncratic ingenuity and a sweet accommodation of both hardcore and casual gamers helped Matthew Smith register his place in ZX Spectrum folklore along with one of the most memorable games of the Eighties: a simple tale of a hungover ex-miner who lives in a weird house and just wants to go to bed. ★

» [ZX Spectrum] The Wine Cellar is guarded by drunken monks.

Hardware Heaven

EDITOR'S CHOICE
Alex Kidd In Miracle World

Sega's pre-*Sonic* mascot made his debut in this fantastic platform adventure. The monkey-like hero is memorable for running, jumping and punching his way through the kingdom of Radaxian, and occasionally hopping onto a motorbike or pedal-powered helicopter. This is one of the very best early Master System games and thanks to being built into many consoles, it's also the first Master System game that many players would have experienced. Just be warned that you'll probably need to track down a cartridge if you want to play it on the original Master System, as it was much more commonly built into the Master System II.

Master System fact

■ The Master System's expansion port is officially unused, but is functional and has been used in custom hardware projects such as FM sound expansion boards and import adaptors.

PROCESSOR: Z80 8-BIT CPU (3.58 MHZ)
RAM: 8KB MAIN MEMORY, 16KB GRAPHICS MEMORY
GRAPHICS: CUSTOM SEGA VDP, 256X192 DISPLAY, UP TO 32 COLOURS ON SCREEN (FROM 64 PALETTE), 64 SPRITES PER FRAME
AUDIO: SN76496 PSG SOUND CHIP, 3X SQUARE WAVE CHANNELS, 1X NOISE CHANNEL
MEDIA: ROM CARTRIDGE (UP TO 8 MEGABIT), SEGA CARD (UP TO 256 KILOBIT)

Master System

» MANUFACTURER: Sega » YEAR: 1986 » COST: £99.95 (launch), £40+ (today)

Much like Nintendo, Sega chose to redesign its flagship console for export markets in the mid-Eighties, resulting in the makeover of the Mark III into the Master System. The black casing and strange diagram on the front of the console showed Sega pursuing a high-tech image, while the presence of a pause button on the console itself was an odd design choice carried over from the Japanese design. The system featured slots for both cartridges and low-cost cards, but the latter format was very limited and quickly phased out. The two-button joypads initially featured screw-in joystick attachments, but these were also phased out. The Master System design was eventually used in Japan for a deluxe version of the Mark III, featuring a built-in FM sound unit not present in the export model.

In North America, the format never gained major traction due to the overwhelming popularity of the NES. However, European distributor Mastertronic and Brazilian distributor TecToy established the Master System as the dominant console in those regions. The original model is less common than the Master System II in these regions today, but it is considered a lot more desirable due to its support for composite AV and RGB SCART outputs.

FLASHBACK

RISE OF NINTENDO

» [NES] The NES took off in the US, taking advantage of the open market left by the 1983 videogame crash.

NINTENDO'S LATE SEVENTIES VIDEOGAMES FOUND SUCCESS IN JAPAN, BUT IT WASN'T UNTIL THE EARLY EIGHTIES THAT THE GAME & WATCH AND DONKEY KONG PUT IT ON THE MAP. AS THE DECADE PROGRESSED, THE FAMICOM, NES AND GAME BOY SET IT ON A PATH TO GLORY

WORDS BY RORY HILNE

Given the popularity of Atari's 1975 Home Pong console and its imitators, it's unsurprising that Nintendo sold a million of its own variant, the Color TV-Game 6, in Japan when it was launched in 1977. The firm's first arcade videogame, *Computer Othello*, followed in 1978, another Japanese exclusive, and in 1979, Nintendo released several coin-ops, including variants of *Breakout* and *Space Invaders*, and original titles that repurposed the mechanics of those coin-op hits. However, these early arcade efforts weren't seen much outside of Japan.

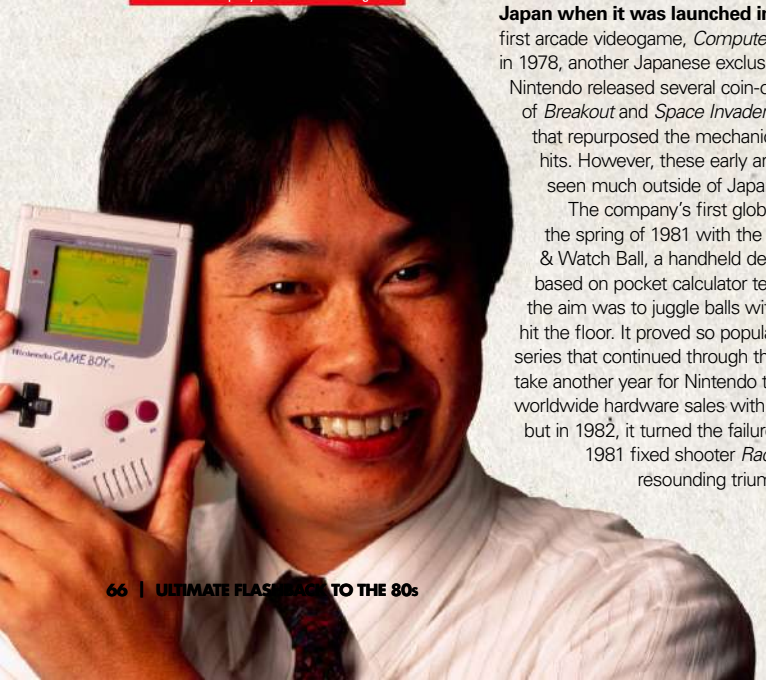
The company's first global success came in the spring of 1981 with the release of Game & Watch Ball, a handheld dedicated console based on pocket calculator technology, where the aim was to juggle balls without letting them hit the floor. It proved so popular that it spawned a series that continued through the decade. It would take another year for Nintendo to replicate these worldwide hardware sales with an arcade game, but in 1982, it turned the failure of its outdated 1981 fixed shooter *Radar Scope* into a resounding triumph by retrofitting unsold cabinets with the entirely original and compelling platform game *Donkey Kong*.

Nintendo's genre-defining coin-op was the most profitable arcade game of 1981 and 1982, and so, of course, it tried to repeat the trick with variations on its themes and gameplay, such as the 1982 arcade sequel *Donkey Kong Jr*, and the 1983 coin-op platformers *Mario Bros* and *Popeye*. But while popular, these *Donkey Kong* follow-ups fell short of the smash hit status achieved by their predecessor.

In the summer of 1983, Nintendo launched a new console in Japan, designed specifically to host a faithful rendition of its great ape's debut, and it really sold the system. Notable 1984 Famicom releases included the lightgun title *Duck Hunt* and the side-scrolling motocross racer *Excitebike*, and by the year's end, these titles and others had helped the Famicom to become Japan's best-selling console. Additionally, many of its games were also released in the US during this time, thanks to a clever move on Nintendo's part.

The US videogame crash was in full flow, so releasing the Famicom there wasn't an option at the time, so, instead, Nintendo built westernised versions of its Famicom titles into cabinets and put them in

» As the creator of *Mario*, *Zelda*, *Donkey Kong* and more, Shigeru Miyamoto is seen as the driver of the company's success in the Eighties.



» *Donkey Kong* marked a shape of things to come at the beginning of the Eighties, and was the harbinger of Nintendo's dominance.

» [NES] Titles like *Duck Hunt* utilised exciting peripherals, such as the Zapper, which were often featured in advertising.

» [NES] Nintendo leveraged its library of arcade titles when choosing games to develop for its home console.

CHARACTER BUILDING

THE NINTENDO ICONS FROM THE EIGHTIES STILL THRIVING TODAY

DONKEY KONG

▶ He was the villain of the 1981 hit coin-op that shares his name, but that didn't do anything to dent his popularity. Outside of arcade outings, the great ape was the protagonist in three *Donkey Kong Country* games, and he has graced various other Nintendo titles over the years.

MARIO

▶ Originally called Jumpman in the *Donkey Kong* coin-op, Mario achieved mascot status after the success of the NES platformer *Super Mario Bros*, which led to an ongoing series. He's featured in countless other games, and fronts franchises such as *Mario Kart* and *Super Smash Bros*.

LUIGI

▶ Initially a palette swap of Mario, Luigi was made taller and better at jumping in the NES hit *Super Mario Bros 2*, and has become ever more distinct in the ensuing years. He has co-starred in various Mario titles, and starred in the *Luigi's Mansion* series and *New Super Luigi U*.

LINK

▶ First appearing in the UK in 1987 in *The Legend Of Zelda*, Link continues his adventures in the *Zelda* series to this day. He has also graced many other franchises, and spin-offs like the lightgun game *Link's Crossbow Training* and the hack-and-slash *Hyrule Warriors*.

SAMUS ARAN

▶ Making her NES debut in 1987, Samus is the heroine of the *Metroid* series of exploration-based action-adventure titles. She's also playable in all of the *Super Smash Bros* games, and had cameos in releases such as *Super Mario RPG*, *Kirby's Dream Land 3* and *Dead Or Alive: Dimensions*.

American arcades, where they went down a storm. Having proven their popularity with arcadegoers, Nintendo unveiled a revamped, rebranded Famicom in the States in the spring of 1985. It then gave its Nintendo Entertainment System a nationwide launch in the autumn of 1986, along with several launch titles, including its iconic platformer – *Super Mario Bros*.

Two more huge Nintendo releases appeared in the same year in Japan for the Famicom Disk System add-on in the form of the seminal action-adventures *Metroid* and *The Hyrule Fantasy: Zelda No Densetsu*. These made their way to the NES in 1987, with *Hyrule Fantasy* getting renamed *The Legend Of Zelda*. Similarly, Konami's compelling 1986 platformer *Akumajou Dracula* was retitled *Castlevania* when it was adapted from the Disk System to the NES a year later. The hits kept coming throughout 1987, including Capcom's Famicom combat platformer *Rockman*, which got called *Mega Man* for its NES release. Rare's fantasy platform title *Wizards & Warriors* also graced the NES in 1987, and Square's epic RPG *Final Fantasy* arrived on the Famicom at the end of the year. NES owners were equally well-served in 1988, with *Super Mario Bros 2* and *Super Mario Bros 3*, the latter of which also appeared on the Famicom, and earned the reputation of being one the systems' best games. In the same year, Tecmo impressed on the Famicom with its action platformer *Ninja Gaiden*, and in 1989, Technos released its innovative beat-'em-up *River City Ransom* on Nintendo's popular Japanese console.

» [NES] *Super Mario Bros* was an instantly accessible platforming classic whose legacy reached far and wide.

The final year of the decade also saw the firm build on the popularity of its Game & Watch series with the cartridge-based Game Boy. The monochrome machine launched with a handful of sports games converted from NES titles, but the reception for these paled in comparison to Mario's debut on the system – *Super Mario Land* – and the must-play puzzle action title *Tetris*. Both releases sold in their millions, with *Tetris* taking the sales crown.

Without a doubt, Nintendo ended the Eighties as the biggest player in the global console market, with its finest releases of the decade embodying peerless gameplay design and polished presentation. These crucially important years also showed the way for the company to forge ahead and set players' high expectations of Nintendo games for the decades to come. ✱

» [NES] *Metroid* was a serious, atmospheric and, at times, spooky space adventure that demonstrated Nintendo's versatility.

© Getty

INSIDE THE Nintendo ENTERTAINMENT SYSTEM

FOR MANY PLAYERS, NINTENDO'S 8-BIT HARDWARE WAS THE DEFINING CONSOLE OF ITS GENERATION. WE SPEAK TO NES DEVELOPMENT VETERANS ABOUT DEVELOPING THE GAMES MILLIONS GREW UP WITH, AND FIND OUT HOW A NEW GENERATION OF CODERS DEVELOP FOR THE SYSTEM TODAY

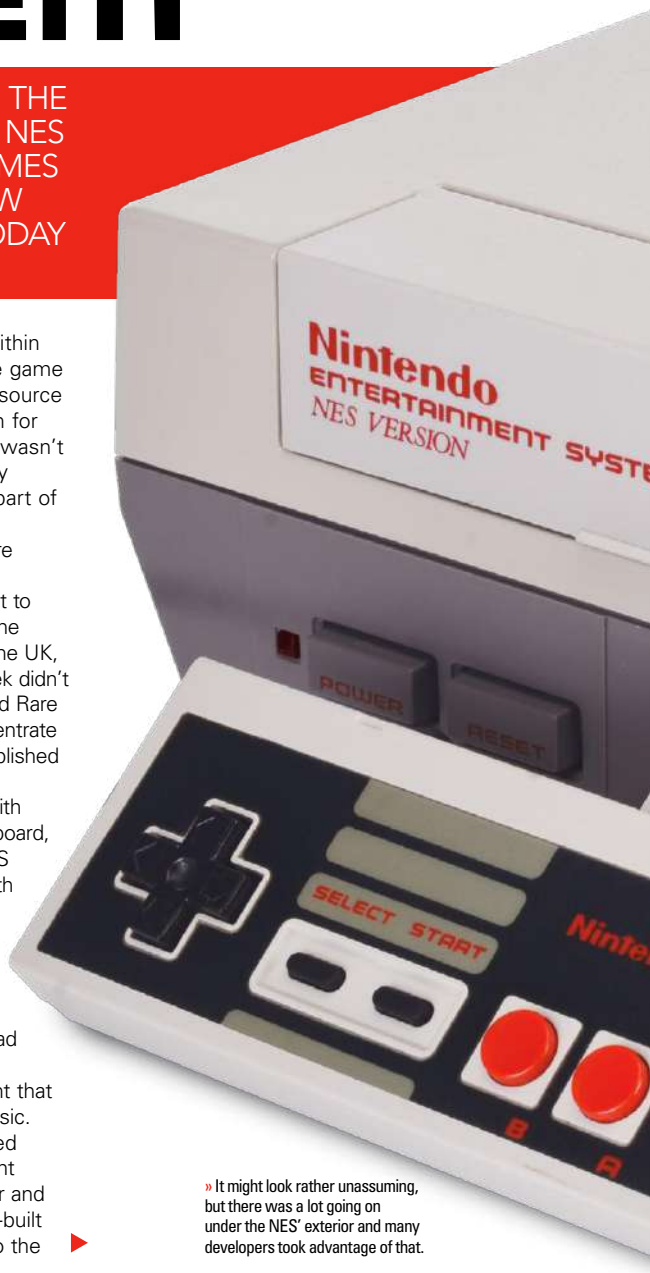
WORDS BY NICK THORPE

The Nintendo Entertainment System, and its Japanese counterpart the Famicom, need no introduction. If you are a fan of retro gaming, you'll know that the 8-bit hardware catapulted Nintendo to a position of global leadership in the videogame business, and hosted the first iterations of countless classic series. Though marketing played an important role in this commercial and cultural success, it wouldn't have been possible without the hardware. After all, the ColecoVision and the Atari 5200 were less than a year old when the Famicom launched in Japan in 1983, and the 3DO and Atari Jaguar were on the market by the time developers finally abandoned the NES in 1994. A machine simply can't stay relevant for that long without hardware that's flexible enough and capable enough to keep up with the changing tastes of gamers. But the NES wasn't just a titan of its time – plenty of developers are creating new games for the hardware, pushing it harder than ever with modern development tools.

Two CPUs and their derivatives dominated the home hardware scene of the Eighties – the Zilog Z80, as seen in the ZX Spectrum, ColecoVision and Master System, and the MOS Technology 6502, which featured in the Atari 5200, Apple II and Commodore 64. Nintendo's engineer Masayuki Uemura opted for the 6502 for the NES, primarily because it was small enough that a chip could also include sound capabilities. In 2016, the late engineer told **Retro Gamer** that this choice caused "a huge problem within the company" as Nintendo's hit arcade game *Donkey Kong* had used a Z80 and the source code couldn't be reused. Consideration for any programmers outside of Nintendo wasn't a priority, as the company didn't initially intend for third-party publishers to be part of its business model.

Of course, the success of the hardware in Japan and North America eventually necessitated third-party development just to keep up with demand for new games. The system didn't have the same impact in the UK, which is why programmer Paul Machacek didn't encounter one until 1988, when he joined Rare – one of the few UK developers to concentrate on Nintendo's system. His previously published games had been written for Z80-based computers, and he was initially tasked with writing for the Z80-based RAZZ arcade board, but he was soon asked to work on a NES project. Fortunately, Paul was familiar with 6502 assembly code from his time as an Oric-1 owner. "I picked it up pretty quickly again," he says, "but forgot about all the number juggling you did on it compared to the Z80 as 6502 has so few registers, but alternatively had the fast zero-page storage."

The development environment that Paul worked with was rather basic. "Originally at Rare everyone used PDS (Programmers Development System) which was a text editor and code assembler. We had home-built interface cards that plugged into the ▶



» It might look rather unassuming, but there was a lot going on under the NES' exterior and many developers took advantage of that.

PAUL MACHACEK
RARE

KEVIN BAYLISS
PLAYTONIC, FORMERLY RARE

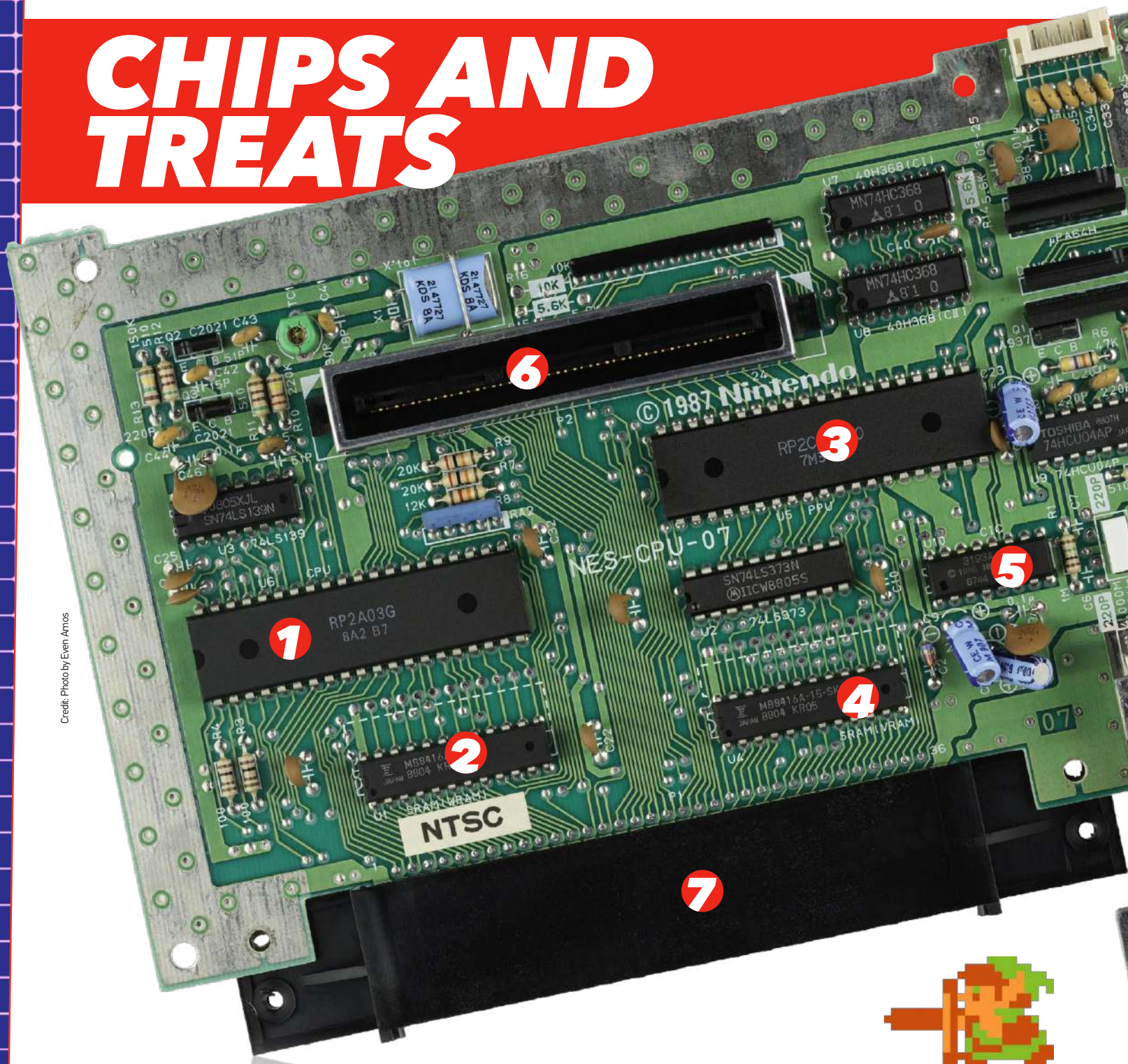
JAMES DEIGHAN
MEGA CAT STUDIOS

NICOLAS BÉTOUX
MORPHCAT GAMES

JULIUS RIECKE
MORPHCAT GAMES

MIKAEL FORSLIND
ELDEN PIXELS

CHIPS AND TREATS



Credit: Photo by Even Amos

1 The 2A03 chip serves as both the 6502 CPU and sound generator for the NES, and was manufactured by Ricoh. In PAL consoles, this is the 2A07 instead.

2 This chip is the system's main work RAM – a rather tiny 2KB, which is fortunately enough, paired with the rather speedy data transfer of the NES's ROM cartridges.

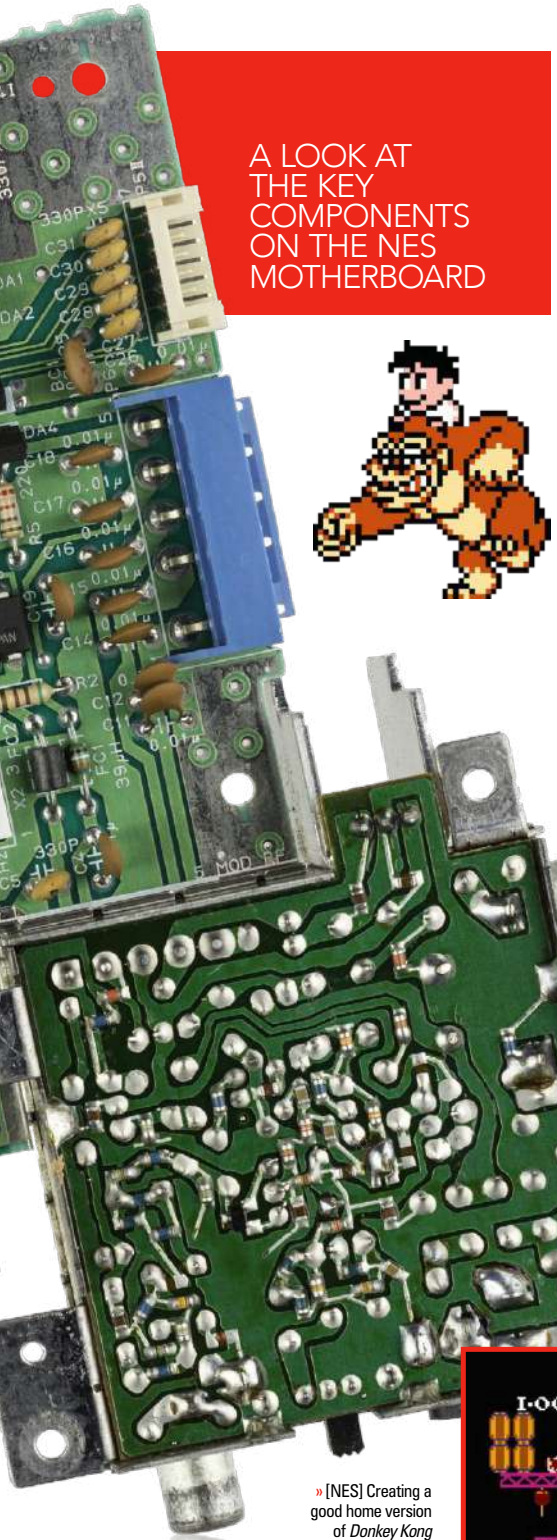
3 The 2C02 is a custom chip by Ricoh, the Picture Processing Unit. It's responsible for the advanced graphical features that the NES offered over the competition.

4 This part of the board is where you will find the RAM for the PPU. Just as with the CPU, this is a rather small 2KB chip that doesn't allow for much more than the bare minimum.

5 This is the 10NES, the infamous lockout chip for Nintendo's 8-bit console. You can find out more information about this chip by reading Protection Racket on page 77.

6 Here's the expansion port – a feature that allowed for the potential to connect devices like a floppy disk drive. However, it never saw any real-world use.

A LOOK AT THE KEY COMPONENTS ON THE NES MOTHERBOARD



» [NES] Creating a good home version of *Donkey Kong* was a priority for Nintendo in 1983.

7 This is the cartridge connector, which can actually be pulled free from the motherboard. A design flaw means these often fail with age and need to be replaced.

cartridge slot on the NES, and they were attached by a ribbon cable to our PCs that ran PDS," he explains. "We had no network. The PCs were Amstrads with 20MB (not a typo) hard disks. Every time you assembled your code – it was all done in one go, we didn't have linkers yet – the full binary would copy over the ribbon cable to the interface card and you'd run your code on the target machine. As for documentation we just had the standard NES manual, which had a few typos in that needed to be corrected otherwise things wouldn't work, and also your handy 6502 instruction set guide for occasional reference, especially if you wanted to write self-modifying code."

If you're a programmer wincing at that, it gets worse. "There were no debug tools as you'd know them today," Paul continues. "There were tricks for finding out where your code got to before things went wrong, like writing values into a memory location and seeing which one was written last before it crashed, then using a bisector search to narrow down to the offending code. For performance testing, you normally had some visual change on the screen (offset a screen horizontal scroll register, or alter a colour palette) at the start of a function, and then reset it at the end so that you could 'measure' how long it took on-screen by drawing marks with marker pens around this visible indicator, and seeing if the marks got closer together as you continued to optimise your code. Yes folks, these were the days you measured code performance in inches!"

That sounds like a fairly awkward way to work, but Paul just sees it as a product of the circumstances at the time. "We did what we had to do back in the day. Folks, go back 35 years, develop what we did with the tools that we had on the systems that we used and tell me you wouldn't end up doing something similar!" Fortunately, this situation would eventually improve for Paul and his colleagues. "After a few years Rare contracted Jon Ritman, a close associate, to write a new system called GLAM [Global Language Assembler Monitor] to replace PDS. GLAM could target a wider variety of processors and had a linker as well as assembler so you didn't have to assemble your entire codebase every single time you changed anything, which speeded up development. GLAM worked really well."

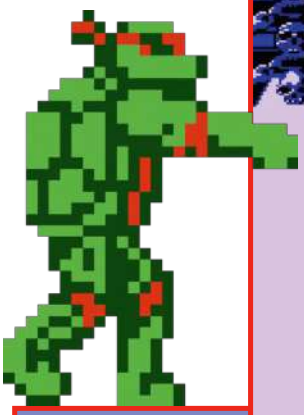
> DEVELOP WHAT WE DID WITH THE TOOLS THAT WE HAD ON THE SYSTEMS THAT WE USED AND TELL ME YOU WOULDN'T END UP DOING SOMETHING SIMILAR!
> **PAUL MACHACEK**

Ultimately, 6502 programming wasn't a big problem for Paul in transitioning to a new platform. "For me, the larger adjustment was going from home computers with bit-mapped screens, to the character-mapped system of the NES, with separate colour palette designations, character banks (and swapping) and memory bank-swapping on the carts," he remembers. Nintendo's Picture Processing Unit – PPU for short – was a custom design by Ricoh, and according to Nicolas Bétoux of Morphcat Games, "Compared to other hardware of that time, the graphics and scrolling capabilities were great."

Indeed, when the Famicom launched in 1983, its closest competitor in Japan was Sega's SG-1000. The Famicom's graphical capabilities were clearly superior – it had a palette of over 50 colours compared to just 16 on Sega's system, sprites could have three colours each as opposed to just one, and screens could be scrolled on a per-pixel rather than per-character basis, resulting in a considerably smoother look. Nintendo's hardware could also display more sprites overall, and more sprites per scanline. Sega introduced the graphically superior Mark III hardware in 1985, meaning that competition took place on a more even footing by the time the NES and Master System made it to international audiences.

While Nintendo's 8-bit hardware had advanced graphical capabilities, the methods used to create those graphics were anything but advanced. Like Paul, artist Kevin Bayliss had never encountered a NES before creating games for the system. "On my first day at Rare, Tim [Stamper] showed me the basic 'pixelation process' and taught me how to create work that could actually be put into a game," he tells us. "I had to basically draw my artwork and place it beneath a grid sheet on

» [NES] In Japan, edited *Excitebike* tracks could be saved to audio cassettes.



» [NES] The large characters of *Creepy Brawlers* were the most challenging task Mega Cat Studios has attempted.

» [NES] *Super Mario Bros* was considered the limit of what the basic NROM mapper could do.

» [NES] *Gradius* was one of the earlier games to go beyond the basic NROM mapper.

a large drawing board filled with fluorescent strips. I'd then trace over my drawing by using the grid to define pixels with a pencil, and then I'd use felt pens to fill out the pixels. Then the work had to be organised and split into boxes (8x8 sprites) and the sprite data and position data all had to be worked out in hexadecimal, in my head. This was pretty easy but a bit laborious at times, and you often didn't want to do this job because it wasn't at all creative. You just wanted to see your work in the game."

If you're baffled by the lack of a computer in that process, you're not misunderstanding anything. "There were *no* tools other than the pen, pencil, paper and a surgical scalpel for scribbling out your mistakes on the tracing paper when you put a pixel in the wrong place, or wanted to chop pixels off a character to allow it to squeeze into less data," Kevin clarifies. "There was a simple sprite editor that Mark Betteridge wrote but this wasn't really used because it was very limited and didn't allow you to view your animation (as they do in all of the old Disney 'behind-the-scenes' footage – by flipping your paper back and forth to create the illusion of animation)."

Since NES development tools weren't standardised, a variety of different art tools were used by different companies. Nintendo did use hand-drawn sprites at one point, but eventually created a mouse-driven pixel-art tool, while Namco had a sprite-editing tool that did have the animation preview facility that Kevin describes. However, he enjoyed the low-tech approach employed at Rare. "It was actually quite nice to have a limited palette. I mean, there's no way you could have drawn all of your graphics on paper for any 16-bit console because you'd never have enough pens, and it would have taken all day to decode – and you would have made so many mistakes – it would have been impossible," he says. "But due to the simplicity of the colour palette and the low resolution and small number of sprites that we mostly dealt with, making graphics on paper was actually quite fun and felt a lot more 'organic' than creating them digitally on the SNES, so I guess there's something to be said for that."

No matter how a developer created art for the NES, technical limitations played their part in the final results. "Sprites per line (more than 64 filled pixels in a horizontal scanline) were a problem so you'd try not to make characters very wide," Kevin explains. For instance, in particular I remember all of the characters for the *WWF* games I did had to either 'fall back' or 'lie on the ground' and of course that meant that they'd be quite wide in that pose. So you'd often try to angle them or be clever with the pose, but you'd never really avoid it. You can see how the characters often flash on and off particularly in beat-'em-up games like that, and

DISK-O INFERNO

WHAT HAPPENED WHEN NINTENDO SWAPPED CARTRIDGES FOR FLOPPY DISKS?

Credit: Photo by Evan Amos

By the time the NES was receiving its test launch in the USA, Japanese developers were reaching the limits of what they could achieve with the basic Famicom cartridge, which offered a mere 32KB of program data and 8KB of graphics data. Nintendo looked to the home-computer market to solve the problem, and decided that floppy disks were cheap to manufacture and offered a number of advantages for both players and developers.

The Famicom Disk System utilised double-sided floppy disks with a relatively large total capacity of 112KB. Hardware interfaced with the Famicom via the cartridge slot, and featured 32KB of program cache RAM and 8KB of RAM for graphics, as well as an additional wavetable-lookup synthesis sound chip. The benefits of that extra sound hardware can be heard when comparing Famicom Disk System games like *The Legend Of Zelda* to their international ROM cartridge counterparts. The rewritable disks allowed players to save their data, and by using special kiosks in stores they could even write whole new games to the disks for a discounted price. Nintendo pushed the new format hard, releasing its first-party games exclusively on the Famicom Disk System during 1986 and most of 1987.

As is often the case with add-ons, the high initial price of ¥15,000 put players off, but that wasn't the only problem – floppy disks were slower to load, fragile and easier to pirate than cartridges. Although some third parties, such as Konami, got on board, the likes of Namco, Capcom and Hudson Soft stuck to cartridge releases. But the biggest issue was that by including bank-switching chips on board, the storage limitations of cartridges could be overcome and additional features could be added to games, whereas the Famicom Disk System spec was totally fixed.

Sales of the Famicom Disk System stalled after a strong first year, and beginning in 1988, Nintendo reverted to ROM cartridges as the media for its major games such as *Super Mario Bros 3*, *Mother* and *Fire Emblem*. Plans for an equivalent device for the NES in the rest of the world had been announced in early 1986, with a projected launch of Christmas that year. However, these plans were never realised, and by mid-1987, they were obsolete as notable games that had launched as disks in Japan reached the NES in cartridge form, including *Metroid*, *The Legend Of Zelda* and *Castlevania*.

it was a problem all companies had to deal with as best they could." That characteristic flickering is actually a clever programming workaround – the NES would simply skip pixels if too many sprites were displayed, so rapidly cycling sprites on and off at least ensured they'd all be displayed in some form.

In fact, NES developers often had to get creative to realise their visions – such as the huge boss characters Kevin drew for *Cobra Triangle*.

"With *Cobra Triangle*, we were lucky because the game took place in an isometric environment, so all the graphics were viewed from an angle which reduced the amount of width that you'd normally see in a horizontally scrolling game," he says. "The boss characters were all a collection of large sprites and we could use the surface of the water to make things appear submerged by adding a few 'ripple' sprites around them at the base. So, for instance, the sea monster (Nessie) character I created was quite tall, and the humps behind her moved around independently, and because of the angle, there wasn't very much in the way of sprite flickering."

> THERE WERE NO TOOLS OTHER THAN THE PEN, PENCIL, PAPER AND A SURGICAL SCALPEL FOR SCRIBBLING OUT YOUR MISTAKES
>
> **KEVIN BAYLISS**

The limitations became more difficult to deal with when developing licensed games, as Rare often did. "For *WWF* wrestling games, we had to make sure there was a good likeness with the characters. So it was hard to 'digitise' the photographs by hand and reproduce the characteristics of everyone accurately when you had only got about 16x16 pixels for a character headshot on the select page," says Kevin. "I remember getting these awful-quality faxes with pictures of the wrestlers on and I was supposed to try and recreate them using such low resolution and three colours." This did lead to some funny experiences, though. "A lot of the time I'd get faxes back from America saying that, 'The graphics were in need of some attention,' because the likeness wasn't quite close enough," Kevin continues. "Then I'd change like, one pixel and then I'd get a fax back the next day saying that the image was much better. It really made me laugh ▶

PICTURE IN PROCESS

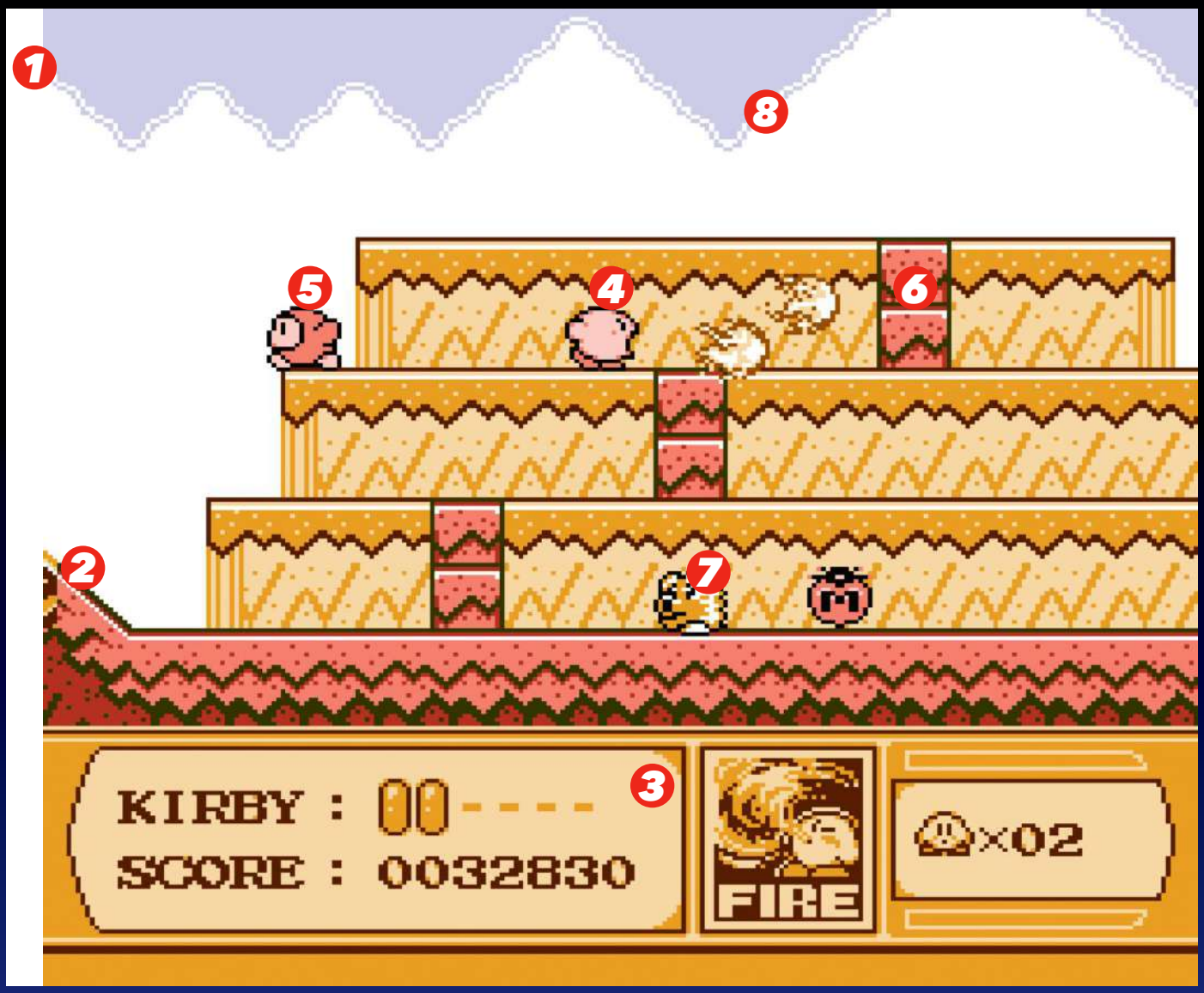
WHAT MAKES UP A NES GAME SCREEN?

1 If a game scrolls both horizontally and vertically, the limited graphical RAM of the NES means tiles can't be drawn in ahead of the current screen position. This border helps to mask glitches caused by this quirk.

2 Although background tiles are 8x8 pixels, 16x16 areas must use the same colour palette. Here, you can see that the leftmost 16x16 grid has taken on the colour attributes from the tiles loading in on the right.

3 *Kirby's Adventure* takes advantage of the MMC3 chip's interrupt request feature to draw this status bar at the bottom of the screen. Reducing the vertical display area ensures a lack of scrolling glitches.

4 NES sprites are limited to four colours, though the need for a transparency marker normally drops that to just three – in Kirby's case, black and two shades of pink. Needless to say, clever art design can work wonders.



5 Economical use of colour palettes is important on the NES as the system can only define four sprite palettes at once. For that reason, the Waddle Dee here uses exactly the same colours as Kirby.

6 Background tiles can use one of four three-colour palettes, plus a universal background colour. They don't count towards the system's sprite-drawing limit, so are often used for less-animated game objects.

7 Although it blends with the background just as well as Kirby's fireballs, this enemy can't use a background palette and actually uses a distinct sprite palette of its own.

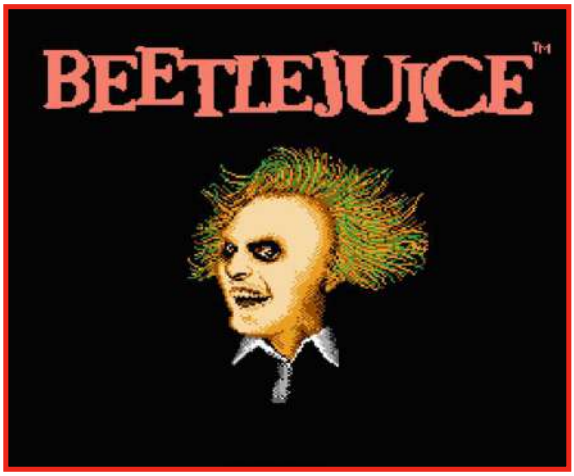
8 Like most systems of its era, the NES can only display a single layer of background graphics. However, the hardware's smooth per-pixel scrolling was a big advantage over rival machines.

when that happened. Also, when I worked on the *Beetlejuice* game, I had the opposite problem, and my title page artwork looked too much like Michael Keaton apparently, and so I had to do it again to make it look more like Beetlejuice – kind of difficult when they're the same person."

Sometimes, it was possible to push the system beyond its theoretical limits. "If you look at *Super Off Road*, you'll notice there are more colours on-screen at times than the hardware can handle as standard," says Paul. "There were four palettes of four colours each, but the first colour in each palette was the same background colour for all. So the total number of colours you could display for background characters was 13. There are more displayed on *Super Off Road* because I changed the palettes with carefully timed access to VRAM during horizontal blanking. This worked fine," Paul explains, before correcting himself. "Well, it did on the US version of the NES. When the game was finished, I was informed it would be released in Japan on the Famicom, which was slightly different in terms of hardware and unfortunately my colour switching wouldn't work on that, so I believe it was not released there."

Audio was handled by the same Ricoh 2A03 chip that contained the CPU. "On the NES, you've got four audio channels to work with. We don't count the DPCM (sample) channel, we don't use it as it has some drawbacks,"

says Nicolas, a developer of modern NES games. "Either way, that's two square wave generators, one triangle wave which is often used for bass lines and one noise channel used for percussive sounds. So you see, there are limited options for polyphony and timbre, which makes it difficult to create a more atmospheric soundtrack the likes of which you'd hear in modern games. Likely, that is one reason why a lot of game soundtracks back in the day made up for it with dynamic compositions and catchy melodies."



» [NES] Here's Kevin's Beetlejuice – or is it Michael Keaton? It could in fact be both.

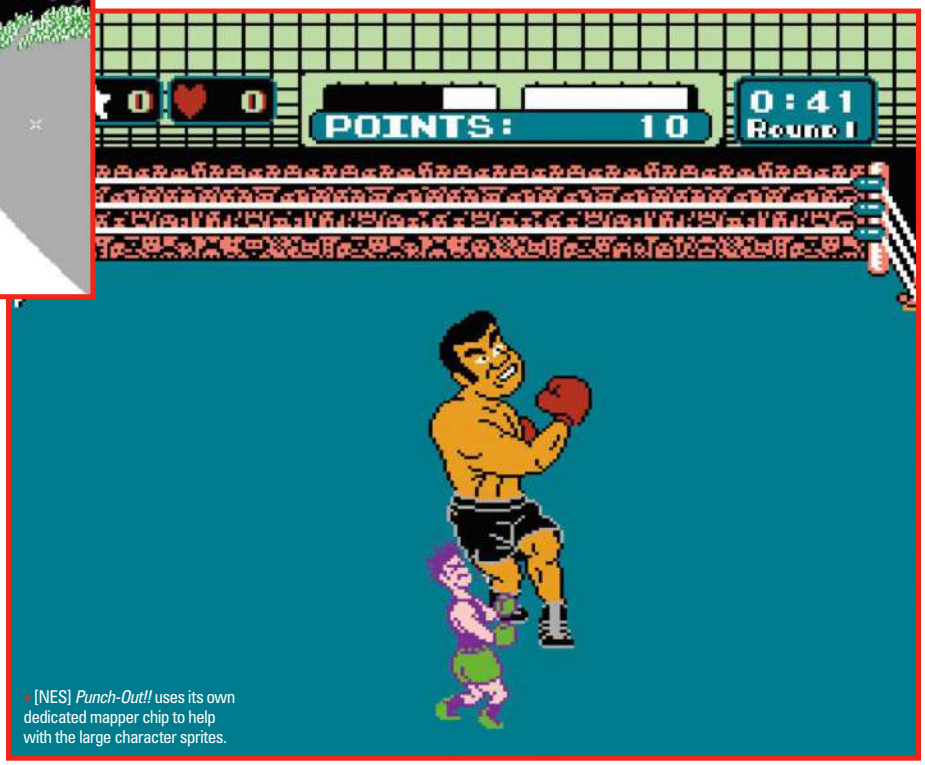
NES audio has some particularly distinctive characteristics, not least the triangle waves which are stair-stepped rather than being smooth, due to the system's 4-bit sound processing. "Due to the limited amount of channels, you also have to be aware that sound effects can interrupt the music," adds Nicolas. "Ideally, you'll have sound effects play only on the channels you use for accompaniment, so they won't silence the melody." Sound is also one of the differentiating points between the Famicom and the NES, as the Famicom supports expanded audio through the cartridge port – something that the Famicom Disk System and certain special cartridge chips take advantage of. Since the NES doesn't have this capability, Japanese versions of games such as *The Legend Of Zelda* and *Castlevania III: Dracula's Curse* have noticeably better music than their international counterparts.

Indeed, it was the special chips that were one of the key factors in the longevity of the NES. As well as supporting both ROM and RAM on cartridge PCBs, the NES was able to utilise chips that Nintendo called Memory Management Controllers. As well as allowing for bank-switching that broke past the storage limitations of the original cartridge specification, these chips could provide extra features to assist in game development, and for the Famicom even expansion audio. That's ultimately how the system was able to go from hosting games like *Donkey Kong* to much more complex titles like *Kirby's Adventure* over the course of a decade.

Of course, even with ROM capacity greatly exceeding the original 40KB total, developers often fought for every byte. "A common issue in those days was trying to cram your

> MY TITLE PAGE ARTWORK LOOKED TOO MUCH LIKE MICHAEL KEATON AND I HAD TO DO IT AGAIN TO MAKE IT LOOK MORE LIKE BEETLEJUICE
>
> **KEVIN BAYLISS**

» [NES] Road effects in games like *Slalom* were created by altering the scrolling after each scanline.



» [NES] *Punch-Out!!* uses its own dedicated mapper chip to help with the large character sprites.

▶ games onto the tiny cartridges we were given," says Paul. "This was complicated on NES/Game Boy (both 8-bit systems with 64KB memory maps) by having to have bank-switching where the region might be divided up into four 16KB blocks, and you could switch different ROM banks in and out of them. So you had to carefully arrange what code and data was where and how you would jump from one ROM bank to another in the same address space, using standard overlay jump tables at the start of the space. We also had to develop data compression routines, often different ones for different types of data – character data, map data, text data, music data. Huffman compression was used quite a bit, but I did spend time staring at printouts of other types of data, looking for patterns that I could use to develop compress software for."

Though on-board chips kept the NES competitive in the face of increasingly powerful competition, true 16-bit consoles eventually offered experiences that were beyond the capabilities of the ageing 8-bit architecture. A huge base of diehard fans and hand-me-down consoles still sustained the system for a while, and the NES saw its final official release in 1994. That wasn't the end of the story though, as the popularity of the machine has endured for decades. "Back in the day, even though I never had a NES of my own, I always looked forward to playing one at a friend's house. I suppose that this circumstance and the great times we had together are what put it on a pedestal for me," says Julius Riecke of Morphcat Games. "Thus, creating a 'Nintendo game' was a dream of mine since I was young. I had lost track of it for a while until it came back to me in 2005, when I learned there was a homebrew scene for this console." Many people share that motivation, and a steady supply of new NES games is released each year.

NES games are made rather differently to the days when Paul and Kevin created them at Rare, thanks to modern tools and emulators with sophisticated debugging features.

> HUMAN PLAYERS WILL INTERACT WITH EVERYTHING AROUND THEM IN WAYS A DEVELOPER CANNOT FULLY PREDICT
> **NICOLAS BÉTOUX**

"We use Notepad++ for coding, YY-CHR and NEXXT for graphics and FamiTracker for music and sound," says Nicolas, explaining the tools Morphcat Games uses. "Julius created special tools like a map editor, tileset editor and sprite-animation editor to simplify some parts of our projects," he adds. James Deighan of Mega Cat Studios says, "Different projects have different pipelines and tools. As a general rule, it's CA65 and CC65, alongside project-specific tools that aid in the development of an individual project. Some tools accelerate collaboration across the team, like level-design workflows where technical artists and game designers can work more closely with each other. Others are project specific for squeezing the most space, as an example, out of a project."

Arguably the most ubiquitous tool used by NES developers today is FamiTracker. "Think entering music notes into a spreadsheet," explains Nicolas. "That may sound excruciating, but the workflow is actually really good when you get used to it, and it certainly beats punching byte values into a text editor manually, while still giving you a lot of control over the intricacies of the sound chip. You can feed the output of FamiTracker into one of the excellent music engines developed by the NESdev community and never have to worry about it again in your game." James is similarly full of praise for the software, highlighting, "The community is great and the resources for using the tracker applications are accessible to anyone, whether you're an experienced composer or just a fan of chiptunes."

With these modern tools at their disposal, NES developers today tend to try very ambitious projects. Four-player action games are a rarity on the NES, but Morphcat Games created an excellent one in *Micro Mages*. This required some very economical use of the hardware. "The NES allows for a maximum of 64 hardware sprites to be on the screen at any time," Nicolas begins. "These sprites are 8x8 pixels in size (there's an 8x16 mode, but it has its drawbacks) and can be pieced together to form bigger sprites.

"So, to get a 16x16 sprite in the first mode, you'll have to use four hardware sprites. If you have all four players use 16x16 sprites, that's one quarter of all the available hardware sprites used on players! Also, there's a hardware limitation where if more than eight sprites are on the same horizontal line, they start to disappear," he continues. "To remedy this and still allow for many other objects and graphical effects on the screen, the player characters in *Micro Mages* use a single 8x8 sprite each." ▶

» [NES] Morphcat Games' *Micro Mages* packs an impressive amount of multiplayer action for a NES game.

» [NES] *Metroid* scrolls both horizontally and vertically, but only in one direction at a time.

» [NES] Getting a good likeness in games like *WWF Wrestlemania* was tricky for Kevin.

PROTECTION RACKET

INSIDE THE LEAST-LOVED TECHNOLOGICAL INNOVATION OF THE NES

■ Nintendo is well known for being particularly protective of its products, and the 10NES chip is the first major example of that tendency. This chip was included in the front-loading models of the NES, and functioned as a locking device, which requested a particular code from the key chip on a cartridge. If that key wasn't supplied successfully, the console would blink on and off.

The primary purpose of the 10NES was to allow Nintendo to keep tight control of the NES software market. Publishers had to pay for a licence to create NES games, without which they wouldn't be able to bypass the 10NES chip. Nintendo argued that this system was in place to prevent a glut of poor-quality third-party games, like the ones that had dented consumer confidence in the Atari 2600 market. However, Nintendo's third-party policies were highly restrictive – its content guidelines were notoriously strict, it limited publishers to just five releases per year and prevented them from publishing on other companies' platforms. Nintendo also acted as the sole supplier of NES cartridges, which gave it a further cut of the profit from each game and allowed it to dictate how many copies of each game could be manufactured. The 10NES also served as a region-locking tool, and an anti-piracy measure.

» [NES] *Action 52* was exactly the kind of garbage Nintendo wouldn't have wanted on the NES.

» [NES] *Micro Machines* made for a rather excellent official release on other consoles.

Various publishers sought to avoid signing up as licensed developers, and worked to circumvent this protection. Tengen obtained a description of the chip from the United States Patent and Trademark Office via deception, and created a clone chip called the Rabbit – a move that would result in Nintendo successfully suing the company for copyright infringement. Early Codemasters games utilised the key chips of licensed cartridges by employing a pass-through cartridge design, similar to that of the Game Genie. Games from Color Dreams typically attempted to mess with the power supply to the 10NES chip to prevent it from operating.

Unlicensed games eventually thrived on the NES. Some of them vindicated Nintendo's stance – games like *Action 52* were infamously awful, while the likes of *Bible Adventures* and *Bubble Bath Babes* violated Nintendo's content guidelines in relation to religious content and nudity. Still, genuinely worthwhile games such as *Micro Machines*, *RBI Baseball 2* and *Rolling Thunder* were released as unlicensed games. The 10NES was not included in the top-loading NES-101 consoles, making them more reliable and region-free.

THE MINI MAKING OF

ALWA'S AWAKENING: THE 8-BIT EDITION

MIKAEL FORSLIND EXPLAINS THE PROCESS OF MAKING AN IMPRESSIVE MODERN NES GAME

WHY DID YOU DECIDE TO CREATE A VERSION OF *ALWA'S AWAKENING* FOR THE NES?
So originally, there was this guy called Paul Molloy, of Infinite NES Lives. On Twitch, he did a fan remake on NES for *Alwa's Awakening* – without us being involved, he did it for fun. We just helped out and promoted it and, you know, joined the chat and watched the videos. So Martin Lindell of Embracer saw these Twitch streams and just emailed me and said, "Would you want to make a full NES release of *Alwa's Awakening*?" I asked Paul but he was too busy and had prior engagements. But here I was with Embracer wanting to fund the whole project, so that's when we put out a job ad looking for NES programmers.

WHO ANSWERED THE CALL?
I knew Brad Smith, who did the NES code, from his *Lizard* games and being part of the retro community. I just knew that he was really talented, so I actually sent him the job ad and I was like, "Would you be interested in this?" He was, so he did the NES port's code, and we did the art, the music, the game design and the level design.

WHAT SORT OF TOOLS WERE USED?
Brad did a lot of cool tools. I think they were written in Python and what they did was that they took the art and the levels we had for the original game – they were made in Tiled, a tile map editor, and the art was just normal PNG sprite sheets – and basically gave us a report that said, "You're using X amount of colours in this sheet and using X amount of colours in this sheet." With that information, our artist could take the art and just decrease the amount of colours.

WHAT KIND OF ADJUSTMENTS NEEDED TO BE MADE TO THE GAME?
The original game was based on a 16:9 ratio, so in order to fit it in a 4:3 resolution, we had to decrease the width of the rooms and we also had to decrease one tile in the ceiling. I think music was the thing we had to change the least, because our composer used the FamiTracker tool to compose NES music. I think the only thing he had to do is just trim a few of the instruments here and there and just decrease the amount of bytes used. But I think his work was like a day or two.

» [NES] *Alwa's Awakening* shows just how much you can achieve with the NES graphically.

ELDEN PIXELS NORMALLY DEVELOPS FOR MODERN PLATFORMS – WHAT WAS THE MOST UNUSUAL ASPECT OF WORKING ON THE NES?
For a number of months, I had four CRT TVs at the office and I had three or four different NES consoles so I could try the PAL, the NTSC, the Japanese ones. You have to deal with all kinds of things like overscan on old CRTs and stuff like that. I wouldn't say it was new to me, but it was new to me as a developer.

» [NES] The main player character uses overlaid sprites to achieve a more colourful look.

» [NES] *Alwa's Awakening: The 8-Bit Edition* is available on PC and Evercade as well as the NES.

» [NES] *Castlevania III: Dracula's Curse* uses the MMC5, one of the most powerful NES mapper chips.

» [NES] The NES wasn't designed to imitate sprite-scaling arcade games, but *Cosmic Epsilon* does an admirable job.

» [NES] *Battletoads* scrolls the walls faster than the back of the tunnel to create an illusion of depth.

The 8-bit CPU also proves to be a limiting factor, according to Nicolas. "If a game has an enemy which only moves sideways and turns around when it encounters a wall, that's a limited number of checks that need to be performed. Human players, on the other hand, are wild cards, they will interact with everything around them in ways a developer cannot fully predict. Also, if players have the ability to shoot, the number of objects on the screen adds up *fast*," he tells us. "This isn't that much of an issue in a single-player game and you usually get away with things in a two-player game. A four-player game, however? Ouch. In *Micro Mages*, we spent a lot of time on optimisation to avoid lag. However, in four-player mode, there are occasions where the game still slows down when there is too much going on."

One advantage that modern developers do have is the ability to pick and choose from a wide range of memory management solutions – commonly known as mappers these days. "They are just so interesting to unpack, and develop for," says James. Despite having the most powerful ones available, they are not always the default choice. "When a game is planned for development at Mega Cat, we start working backwards from what's required for the core gameplay to be fun," James explains. "In some cases, we end up defaulting to something powerful like the MMC3 mapper. In others, we can keep it simple and use a discrete mapper, like an NROM." Indeed, the recent NES game *Blazing Rangers* from Japanese developer Karu_gamo specifically used the simplest mapper, the NROM, to evoke nostalgia for the early days of the Famicom.

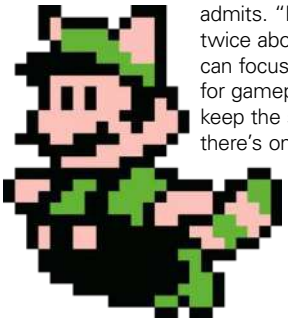
That's really the core of the ongoing fascination with the NES from developers – not only is it a technically interesting system, but one that offers a strong nostalgic pull. Even those who first encountered it in a work context, like Kevin Bayliss, feel that nostalgia. "I enjoyed working on the NES as an artist, because you really knew the system eventually. Whether you were creating backgrounds, animated sprites, title pages or front-end (scoreboard) graphics – you had a system in place that you'd used on a previous game and occasionally you'd come up with something new to push it a little further and squeeze a little more out of it visually. Simple times, but fun!"

Although Paul laments the number juggling inherent in programming for the 6502, he also remembers the system fondly. "I loved coding the NES, it was a completely different architecture from the home computers I'd worked on before, there were interesting tricks you could play with the character-mapped screen which you could exploit to give depth – go check out our *Battletoads* games on NES/Game Boy – and I regarded it all as an interesting technical challenge to 'solve' new issues around this alternative hardware architecture." But for all of the fun of programming the system, Paul rightly points to the results of that work as the reason for the success of the NES. "It can't be forgotten that Nintendo had an incredible catalogue of games on the systems, notably *Super Mario* and *Zelda*. *Super Mario Bros 3* was a huge step forward, and an absolute pinnacle at that time," he says.

> I LOVED CODING THE NES, IT WAS A COMPLETELY DIFFERENT ARCHITECTURE FROM THE HOME COMPUTERS I'D WORKED ON BEFORE
> **PAUL MACHACEK**

If you're an aspiring retro game creator, the NES might just be the ideal platform for you. "NES code, graphics and sound are easy to manage by one person each in the team," says Nicolas. "Compared to now, the programming language feels more obscure and complex than modern languages. All the limitations push you to spend more time for everything," he admits. "But it also forces you to think twice about each idea. In the end, you can focus on the most important ones for gameplay. These limitations can keep the scope of your game in check – there's only so much you can do." If you find yourself drawn to the idea of tackling that technical challenge, show us the results one day – we'll always be interested in seeing them. *

» Modern NES releases often meet the physical quality of the retail releases of old.



MARIO
PLATFORM SUPERSTAR

MARIO IS ONE OF THE MOST CONSISTENT STARS IN GAMING, APPEARING IN 2D PLATFORMERS THAT HAVE ATTRACTED CRITICAL PRAISE AND MASSIVE SALES FOR OVER THREE DECADES. WITH THE AID OF A PANEL OF EXPERT COMMENTATORS, WE REVEAL WHAT MAKES THEM SO FANTASTIC

WORDS BY NICK THORPE

When you look at the 2D platform genre, one series stands alone as the king of the craft – *Mario*. We're sure that some people want to argue with that, but when push comes to shove and the public has its say, it tells us that the 2D *Mario* games are brilliant. **RG** readers voted *Super Mario Bros 3* as the best NES game ever, and declared *Super Mario World* to be the greatest game of all time. The sales of the games are frequently measured in the tens of millions rather than mere millions, and it's worth considering that for all the critical love directed towards the 3D entries in the series, their commercial performance pales in comparison – *New Super Mario Bros Wii* outsold both *Super Mario Galaxy* games *combined*. But what makes the games so great?

To really tackle that question, we need to look back to the very first game – one that is remarkably poorly documented, given its importance. Historians can't even agree on its North American release date, and because of the diminished importance of the console scene in the west during the mid-Eighties, there are very few contemporary reviews. Thankfully, the experts of the time can remember the impact that it made on them. One of those experts was Julian 'Jaz' Rignall, who was offered the chance to play an American NES console in early 1986, during a visit to Activision. "Needless to say, I jumped at the chance," he recalls. "I played *Excitebike* first, which was really enjoyable, but then I plugged in *Super Mario Bros* and was absolutely blown away."

Why did the game make such an impression? "The smoothness of the fullscreen scrolling was deeply impressive, and the graphics, music, feel of the controls, and the overall gameplay were all incredibly well polished, designed, and presented," Julian highlights. "It made most of the Commodore 64 games I was playing at the time feel old-fashioned and rather clunky. Comparatively, *Super Mario Bros* looked and felt like a full-on arcade machine. I immediately fell in love with the game, and couldn't stop thinking about it as I travelled back home to Ludlow on the train. I absolutely *had* to get a Nintendo Entertainment System, and the moment it was officially released in the UK a year or so later, I rushed out and bought one."

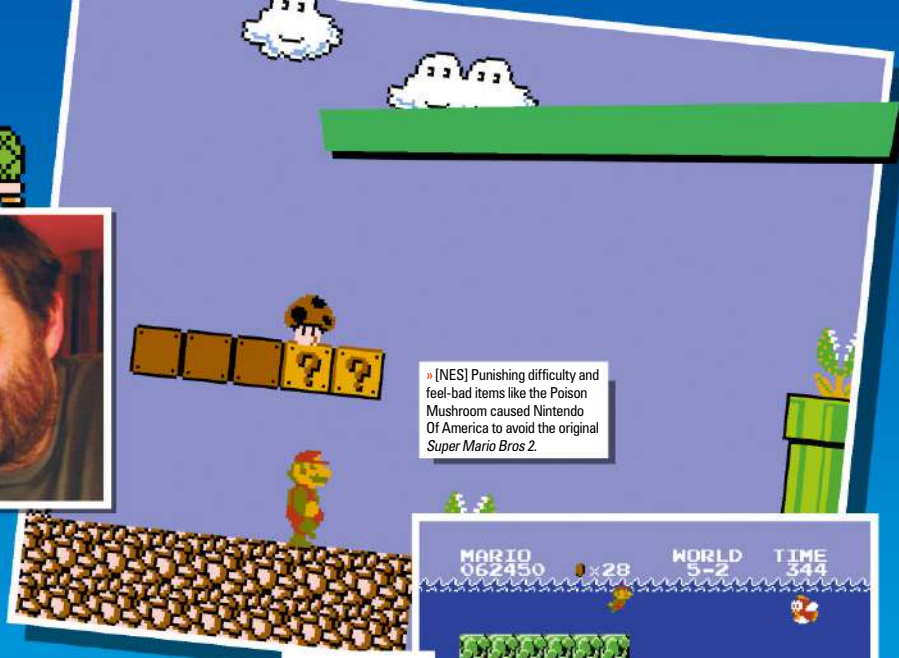
The design of the game was a huge step up compared to the game's predecessor, *Mario Bros*. That game had offered single-screen action with fixed level designs. By comparison, *Super Mario Bros* had scrolling stages many times the length of the screen, taking in outdoor stages, underground courses, underwater sections and deadly castles. Each part had unique graphics and musical themes, interesting objects including springboards and lifts, and there were plenty of secret areas accessed by travelling through pipes. In the case of the underwater stages, the game's mechanics changed massively as the jump button was reassigned to the task of making Mario swim, greatly altering the feel of the game. *Super Mario Bros* also featured an even greater variety of enemies with distinct and challenging behaviour, as well as boss battles. All of this was achieved in just 32KB of ROM, which was a remarkable feat.

Like the previous game, players were encouraged to jump into platforms from below – but instead of merely bumping the platforms to tackle enemies, players could break blocks, which was a massively important level design tool. John Romero, whose admiration for the *Mario* games fed into the design of the *Commander Keen* platformers, explains why

» Julian Rignall saw the *Super Mario Bros* series grow while writing for *CVG* and *Mean Machines*.

» John Romero saw success with the *Commander Keen* platformers before id hit big with *Doom*.

» Kevin Bayliss' graphics helped bring platformers from Rare and Playtonic to life, including *Donkey Kong Country*.



» [NES] Punishing difficulty and feel-bad items like the Poison Mushroom caused Nintendo Of America to avoid the original *Super Mario Bros 2*.

» Ste Pickford's (right) long career includes the fondly remembered SNES game *Plok*.

» Chris Sutherland (left) has designed great platformers at both Rare and Playtonic.

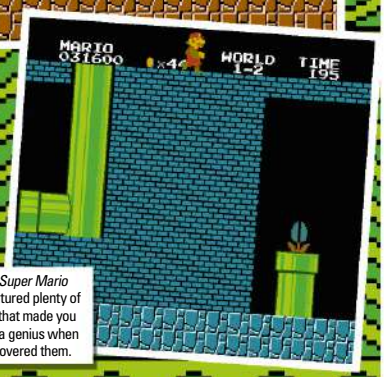
» [NES] Swimming sections add variety, though they're tough as Mario is more vulnerable and harder to control.

» Sten is a prolific *Mario* speedrunner, with a particular fondness for *Super Mario World*.

» Ross O'Donovan's (left) *Super Mario Maker* courses torment popular YouTubers the Game Grumps.

» Derek Yu (right) is an indie developer best known for his breakout platform game *Spelunky*.

» [NES] Cool combat tricks, like kicking a shell through a row of enemies, make for a lot of *Mario*'s fun.



» [NES] *Super Mario Bros* featured plenty of secrets that made you feel like a genius when you discovered them.

these are so useful. "Allowing blocks to break, design-wise, could be used to clear a space for a difficult jump. Hiding secret areas with destructible blocks is also a great use, such as breaking a block at the top of the screen to allow Mario to jump up and on top of the level," he explains. However, blocks had a secondary purpose that John finds even cleverer. "Hiding items in a broken block was genius – the block didn't just disappear, it gave you a reward. The idea of also changing the state of a block was smart as well – you keep hitting your head on a block as it pops out coins until it becomes solid and is done giving rewards."

Those rewards are a key part of the *Mario* design. Coins do nothing on their own but grant an extra life when 100 are collected, and are frequently imitated by other platform games – for example, with *Bubsy*'s yarn balls or *Rayman*'s Tings. More immediately rewarding were the power-ups, which could protect Mario from enemies and expand his combat ability. Added to the returning ability to knock enemies off higher platforms, this provided two familiar ways to handle threats. "One of the tricky things with power-ups is that they can be used to bypass many carefully-set-up game design puzzles, which if they can be activated anywhere makes life very challenging for the designer," notes Chris Sutherland, whose career highlights include platform games like *Donkey Kong Country* and *Yooka-Laylee And The Impossible Lair*. "That's why *Mario* games have the power-ups placed very carefully, with the expectation the player will choose to use them; but what's great is that it's rarely a requirement, so if you miss it, you're not blocked," he continues. "In fact, when you encounter a specific power-up, that's often a clue that this is to help you with an imminent challenge. For example, if you uncover a Star power-up, you're sure to find some tougher enemy configurations to run through in the coming screens ahead."

Interestingly, combat is an aspect of *Super Mario Bros*' design that is frequently overlooked. "I think we sometimes forget how weird jumping on enemies to kill them was when *Mario* games first appeared. It was unique. In almost every comparable game touching an enemy would kill you," says Ste Pickford, who worked on the fondly remembered SNES platformer *Plok*. In fact, Nintendo's developers had felt it strange that jumping on Koopas would harm Mario in the original *Mario Bros*, as the reasonable expectation would be that the turtle would come off worse – and it was that very point that led to the use of jumping attacks. "The idea of touching an enemy in a certain way (from above) changing the rules, and instead killing the enemy, was quite a subtle, clever and sophisticated game system at the time. *Joust* is the only other game I can think of that did anything similar. I remember being blown away by it at the time. Both amazed at the idea, and surprised that they went to the trouble to program a relatively sophisticated system like that," Ste recalls, before explaining the broader implications that jump attacks had for the genre as a whole. "The idea has been reused by other, later games, and is now occasionally used as a 'standard' platform game system,

SUPER SPEED BROS

STEN EXPLAINS WHY SUPER MARIO WORLD REMAINS AN ENDURING FAVOURITE IN THE SPEEDRUNNING COMMUNITY

Sten is a formidable speedrunner, with a variety of quick completions of the classic games – he can beat the original *Super Mario Bros* in under five minutes and can get through *Super Mario Bros 3* in less than three and a half minutes. But his most prolific exploits have been with *Super Mario World*, where he registers strong performances across a number of categories, including doing the full 96 exits in one hour, 22 minutes and 36 seconds – a time that puts him amongst the elite.

Thanks to his familiarity with the game, Sten has noticed the ways in which the game design supports speedrunning. "Most of the 2D *Mario* games tend to give you enough room to get up to full speed quite easily near the start of most levels, then it can be a matter of precision platforming and tight jumps, but you can usually maintain full speed through most of the stage," Sten explains. However, *Super Mario World* is not entirely speedrun-friendly. "The worst type of stages for speedruns are autoscrollers, or some on-rails levels (such as ones with moving rafts that you can't avoid riding), purely because you're stuck moving at the game's pace. Some of the on-rails levels can be 'cheesed'," he tells us. "In fact Cheese Bridge Area in *Super Mario World* is intended to be an on-rails level, however if you enter with cape and yoshi you can just run, hold right, and hold jump at the right point and you'll get straight to the end of the level."

Part of what makes *Super Mario World* interesting to run is the metagame that comes from the use of the world map in certain categories. "For a lot of categories there will just be one optimal route through the game, and that'll be the one you take. However for categories such as 96 exit – which beats every exit of the game plus Bowser – there are multiple routes through the overworld that neither save nor lose time. This allows runners to choose a route based on what levels or backups that they'd like to have earlier in the run," explains Sten. "For example, one 96 exit route gets the green switch early, which gives access to more backup capes earlier on, but it also puts Donut Plains 2 – a long autoscroller that you have to play twice – earlier in the run, meaning that if you reset after this point you have to spend another few minutes sitting around in an autoscroller. Other routes put more difficult stages earlier in the run, and some levels can be more consistent early in the run."

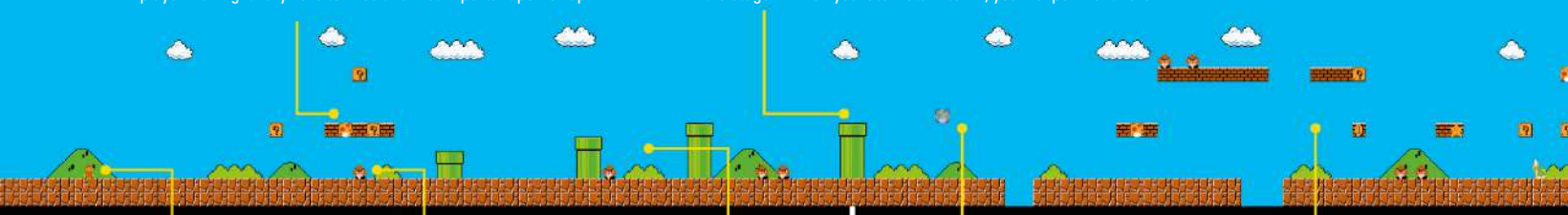
Like a growing number of skilled retro game competitors, Sten is younger than *Super Mario World* itself. Why do players keep flocking to this game? "*Super Mario World*'s a reasonably easy game to pick up as a speedrun, and it's a very well-known game, so just the sheer number of people running it leads to more people becoming good at it and competing at a high level," he says. But unlike the likes of *Donkey Kong*, which has retained a stable top level over many years, *Super Mario World*'s best and brightest are constantly changing according to Sten. "Even if older runners stop playing, new ones will tend to move in to take their place. I started running *Super Mario World* a bit over four years ago, and about half the top ten in most major categories picked up the game more recently than that."

THE BASICS OF BRILLIANCE

FOR MANY, WORLD 1-1 IS THE PINNACLE OF INTRODUCTIONS

The question mark blocks entice players into interaction. "The first question block that contains a mushroom is on a short platform so the player can understand how the mushroom slides to the right once revealed," notes Chris. "Also a pipe is placed to the right, so the mushroom rebounds towards the player making it very hard to miss this first important power-up."

The one lesson 1-1 doesn't teach you is using pipes. "One thing I love is that right at the start of 1-2 you see Mario entering a pipe to go underground, rather than just being placed directly underground," says Sten. "This teaches the player how pipes work and makes sure they're familiar with them for the pipe at the end of the stage." When you later return to 1-1, you'll experiment here.



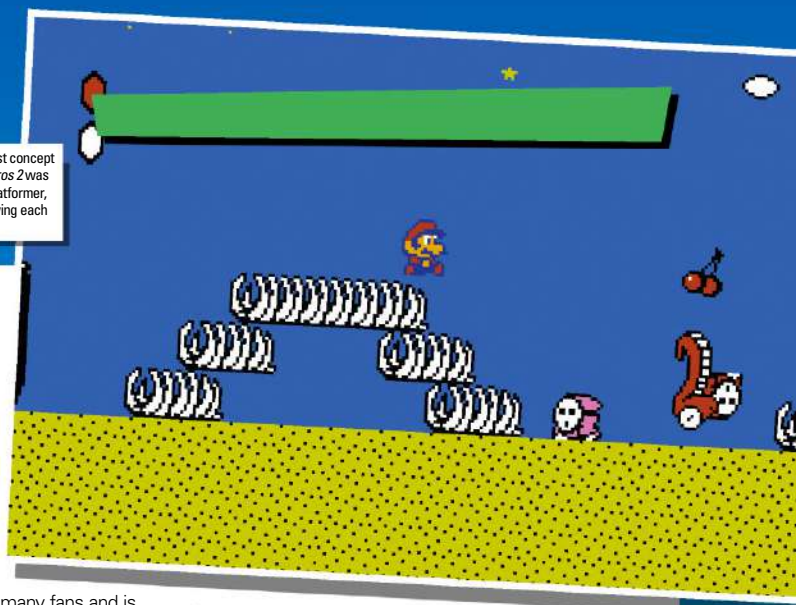
The very first screen of *Super Mario Bros* presents you with Mario and very little else, encouraging you to experiment. "If it were designed these days, there would be lots of little waypoints and glowing blobs to follow, maybe one or two pop-up tooltip-type messages telling you to jump on things," says Julian "But it's got none of that, and doesn't need to."

Your first encounter with an enemy is with the simplest of the lot – yet even this is important. "I recall when I was five and playing it for the first time, I just kept running into the first Goomba over and over," says Ross. "It truly was the perfect way to teach someone new to videogames that one of the buttons on the controller might be able to help you with this simple obstacle."

Although the player should be familiar with jumping by the time they reach the series of pipes, Chris notes that they have an important function. "Pipes of increasing heights are placed as obstacles – this helps the player understand that Mario has a variable height jump determined by the duration of the button press."

Something that many first-time players might miss is this extra life mushroom. "The fact that invisible blocks are hidden in the air encourages a ton of random jumping to see if any are around," says John. The automatic movement of the mushroom and its proximity to a bottomless pit also teaches the player a lesson – sometimes, they need to act fast to get the best items.

As the level goes on, blocks are placed higher. "The first thing it encourages is jumping and getting better at it, then aiming at blocks to hit with your head," says John. "Putting blocks up high shows the player they should jump to get higher. Power-ups are immediately available, and that lesson is taught on the second screen. Multiple types of power-ups, too." The star and Fire Flower are often encountered here.



» [NES] The earliest concept for *Super Mario Bros 2* was a vertical co-op platformer, with players throwing each other up-screen.

by people writing new retro-styled games, but it always annoys me when it's used in other games as it feels like a unique feature of *Mario*, and one that you shouldn't rip off."

For dedicated players, *Super Mario Bros* included plenty in the way of secrets. As well as the areas hidden at the other end of the game's numerous pipes, hidden blocks could grow vines leading to new areas in the sky, and particularly well-hidden Warp Zones allowed players to skip many stages. "In *Mario*, I always loved how you could go beyond the top of the screen because it felt like you weren't supposed to be there – in my opinion, the best secrets never feel like they were designed (and some of them, like Minus World, aren't!)," says Derek Yu, creator of the indie hit *Spelunky*. Such secrets have informed his own philosophy on game design. "To me, it's almost unimportant whether a secret will be discovered so long as it feels like a natural part of the game world. In this day and age, it's hard to bury a secret so deep that no one will discover it. Instead, I focus on making sure secrets are connected to the rest of the game in meaningful ways. "

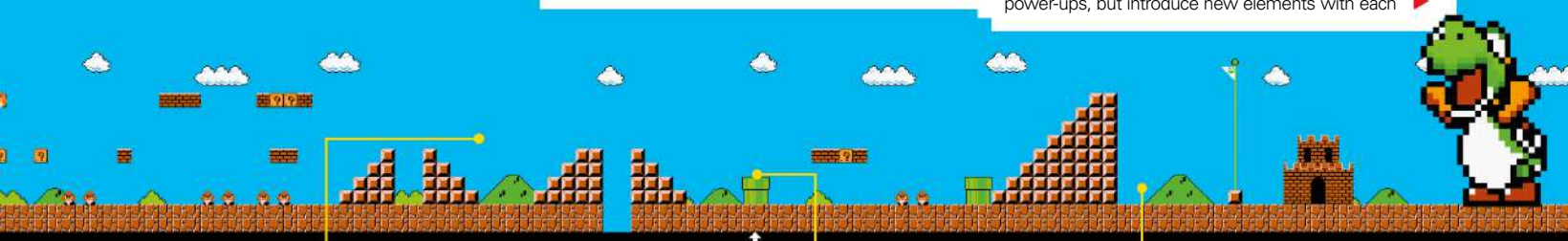
Nintendo even managed to work a little extra fun into the act of completing a stage, by challenging players to earn extra points by reaching the top of the flagpole that signified the finish line. "A great game design principle is to try to make everything into its own little game, and that's something that *Mario* games have always been good at, so you have games nested within games, minigames within the macro-game, and micro-games embedded into every subset of the game itself," says Ste. "Having an extra little game when you complete the level is a perfect example of this." Indeed, this principle was carried forward with the random power-up box in *Super Mario Bros 3* and the moving bar in *Super Mario World*.

While most of *Mario*'s excellence can be traced back to the first game, the series famously evolved in divergent directions with its second game. The Japanese *Super Mario Bros 2* offers very little notable evolution over the original game, instead feeling more like an ultra-tough expansion pack. For the international market, Nintendo localised the unrelated *Yume Kojo: Doki Doki Panic*, which had incorporated some *Mario*-style elements, but felt rather different thanks to its core concept of lifting objects and throwing them. "*Super Mario Bros 2* was a misstep for the series, and lost the essence of *Mario*, in my opinion," says Ste, and it's hard to disagree with him too strongly. Although the game has many fans and is an accomplished platform game in its own right, the series returned to its core combat concept of jumping on enemies, and although Mario has since had the ability to carry objects it has rarely been enormously important. The game's most important contribution to the series was arguably the introduction of themed worlds, each featuring distinct hazards.

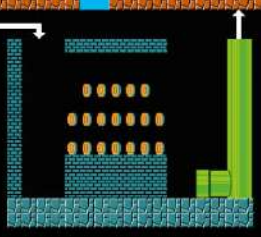
***Super Mario Bros 3* brought the series back to a single worldwide standard, and had a much bigger influence on the series as a whole.** John Romero was part of the id Software team that pitched a PC conversion of *Super Mario Bros 3* to Nintendo, so we had to ask what made the game stand out to him at the time. "The amazing control and the huge amount of variety in the eight worlds. It even *felt* like it was going to be the last *Mario* for the NES – they pulled out all the stops and created a masterpiece." Sten, a speedrunner with a fondness for the *Mario* series in general and *Super Mario World* in specific, agrees that it was a major accomplishment. "I reckon the biggest advance in the formula was *Super Mario Bros 3*, which added the world map, letting you choose different paths, and different levels. It also made better use of secret areas, adding hidden items and power-ups to them, giving more of an incentive to explore every last inch of a stage. These have both been carried on into the rest of the 2D *Mario* games in some form or another," he tells us. "Lastly, it expanded the power-ups beyond just mushroom and fire. Every game from *Super Mario Bros 3* onwards has had some sort of new, usually unique, power-up to change things up a bit. Each game has added something new to give things a bit of a twist, but the overall formula has basically remained the same since *Super Mario Bros 3*."

Where previous games had featured broadly linear level progression, warp zones excepted, Nintendo introduced a new feature that fundamentally changed the way that players approached the game without interfering with the platforming one bit. Map-based level selection transformed the structure of the series, removing the linearity of the experience by letting players choose the order in which they challenged stages, or indeed whether they played them at all. "*Mario* games going nonlinear essentially removed that potentially problematic aspect of their gameplay where you can get stuck at a certain point and feel like you're banging your head against a brick wall. The nonlinear *Mario* games empowered players to play the game at their own pace and tackle things in the order that they wanted," says Julian. "Got stuck on a level? You can try playing a completely different map, and maybe learn a few things there that would help you get past the point where you were originally stuck. Or it would at least let you return to it with a fresh perspective."

Super Mario Bros 3 also started a tradition of refreshing the power-up selection with each game. "*Mario* games generally feature the same 'classic' power-ups, but introduce new elements with each

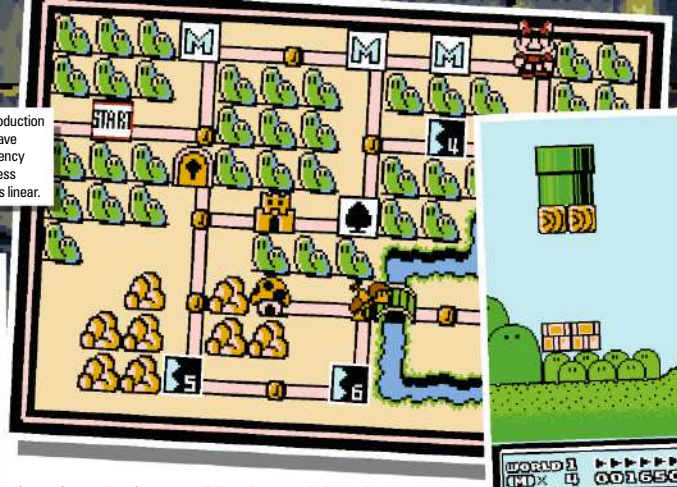


"The level introduces the game elements piece by piece, basically letting you experiment with Goombas and mushrooms and jumping and figure out how everything works before slowly combining things and adding more danger and consequences," says Sten. Indeed, the final stretch of the stage combines everything you've learned so far en route to the goal flag.

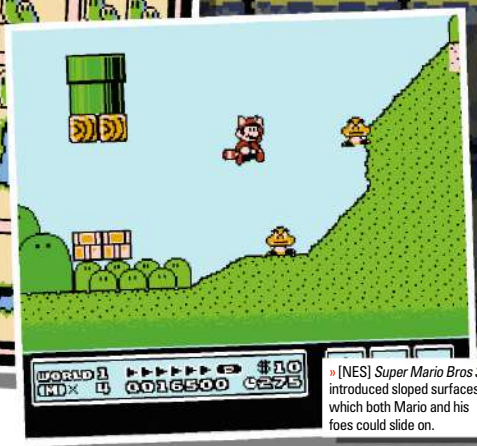


If you visit the secret coin stash by going down the pipe earlier in the level, you'll emerge from this pipe very near to the end of the level. Although it's a fun level to replay, the use of a secret that only a moderately experienced player would be aware of allows you to skip much of the game's informal tutorial – a clever choice on Nintendo's behalf.

Providing a staircase doesn't just assist players in reaching the top goal flag – it gives players the idea that they should be doing so in the first place. In later stages, variations on this structure signal the end of a stage, in a useful little piece of visual signposting. They also create miniature challenges for the player as they try to work around the changes to keep reaching the top.



» [NES] The introduction of world maps gave players more agency and made progress considerably less linear.



» [NES] *Super Mario Bros 3* introduced sloped surfaces, which both Mario and his foes could slide on.

additional entry in the series. In other words, the series sticks to its fundamentals while adding new and special power-ups that are unique to each game. To me, that's a stroke of genius," says Julian. "Whenever you started playing a brand-new *Mario* game, you had no idea of what to expect. It made the game exciting to play. You knew that you'd be running, jumping, swimming, growing and shrinking, and firing missiles at enemies – but you had no idea what else would be in store. *Super Mario 3* had items like the Tanooki and Frog suits that gave you completely new powers, and that was really good fun." Where *Super Mario Bros*' power-ups had dealt with combat, these ones trod new ground by improving his ability to traverse stages.

Following *Super Mario Bros 3*, the introduction of the Game Boy saw the parallel *Super Mario Land* line developed. The first game borrowed heavily from the original *Super Mario Bros*, though it did have unique mechanical wrinkles like Powerball Mario and shoot-'em-up sections, while the second took after *Super Mario Bros 3* with more complex stage designs and a world map. Though both were great, neither contributed so much to the series' long-term development as the next major home console game, *Super Mario World* – a launch game for Nintendo's new 16-bit console, the SNES. As well as featuring significantly improved graphics, the sequel expanded on the map system of the previous game, introduced the new Cape Feather power-up, and added Yoshi as a companion character for Mario to ride.

The new inclusions were a hit – particularly *Mario*'s new pal, who quickly became popular enough for his own spin-offs. "I loved the addition of being able to ride Yoshi in *Super Mario World*," says Kevin Bayliss, an artist with experience on hit 2D platformers at Rare and Playtonic. "Not only does it look super cute and cool, but it opened up a whole new dynamic within the game, which is now the kind of thing you automatically associate with the series. This is something that has continued and been expanded upon both in 2D and 3D *Mario* games, and it's one of my favourite features." But it wasn't just the new power-ups that impressed players, as even small level design features did a lot of work. "The iron fences that you climbed, with a little gate that flipped you from the front to the back of the fence – that was such a lovely, clever little idea, expanding on what the player was already familiar with, but adding a new dimension," says Ste.

One of the big advancements in *Super Mario World* was the ability for players to alter the layout of stages by activating new blocks in the Switch Palace stages. "I believe that in *Super Mario World*, the dotted-line blocks were added as a means for the player to adjust the difficulty themselves, with the intention that if the switches were all activated the game would become much easier," highlights Chris. "What it adds is replayability to existing levels. From a development perspective that's a good option, as it is much faster than crafting whole new levels, but it also has benefits for the players too. By having reasons to repeat play, players are encouraged to experiment in levels they already know and perhaps find secrets they didn't spot first time around." In fact, Chris believes that the design actively works towards this. "It's often interesting to consider why a particular design decision was made; in *Super Mario World*, they could have opted to not show the dotted-line blocks in the levels until the Switch Palaces were activated, but instead by having them visible in the levels they set up recurring questions in players' minds, so that when the Switch Palace is triggered it acts as a reminder of those queries, producing that feeling of, 'Oh! So now if I go back to that point in that level…'"

Since *Super Mario World*, 2D platformers have taken something of a back seat in the *Mario* series. *Yoshi's Island* introduced a whole new formula, and it wouldn't be until *New Super Mario Bros* in 2006 that the series returned to 2D. That game was a joy to behold, as enemies hopped to the beat of the music and Mario could shrink to microscopic levels or grow to screen-sized proportions. However, being designed as a somewhat nostalgic experience, the game didn't make huge mechanical strides beyond the introduction of moves from the 3D games. Indeed, this has been one of the problems that Nintendo has faced with subsequent entries in the *New Super Mario Bros* series. The developers have tinkered around the edges of the formula, introducing simultaneous multiplayer and features designed to make use of the Wii and Wii U's unique controllers, but despite massive sales they've been criticised as 'safe' and 'by-the-numbers'. They're still considered to be better than the vast majority of platform games, and that highlights the difficulty Nintendo's designers face as victims of their own past successes – how can they expand on a formula that's already considered by many to be peerless?

Of course, you don't have to guess how hard it is to make *Mario* games. Previously restricted to the

BREAKING THE RULES

The Super Mario Maker community has come up with plenty of stages that do things Nintendo never would. Here's a look at some of those things – as well as some Super Mario Maker 2 stages that do them…

▲ AUTO-MARIO

These aren't like the autoscrolling stages in *Mario* games – these are more like Rube Goldberg machines. In these spectacular demonstrations, which sometimes involve music, a variety of objects will push Mario to the end of the stage automatically as long as you either press nothing or hold a specific direction.

RISKY RIDE
3JV-B3N-HXG

▲ METAGAMES

These stages use *Mario* mechanics to produce an entirely different experience, often based on other videogames. We've seen examples including a crafty take on *Pac-Man*, a brilliant claw machine and various 'table tennis' levels, as well as a recreation of *Teenage Mutant Ninja Turtles*' infamous dam stage.

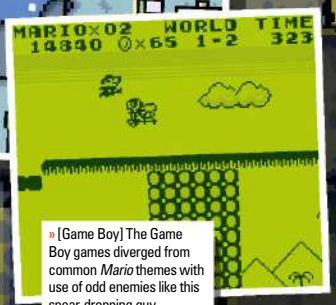
3D MAZE HOUSE
P59-698-55G

» [NES] Boss battles are a staple of the series, though Bowser often recruited minions after the first game.

» [SNES] The *Super Mario World* map was more complex than before, with plenty of alternate routes and warps.

modding community, the ability to make your own *Mario* stages has been officially available to millions of players since 2015, thanks to the *Super Mario Maker* games. Seeing what players did with Nintendo's tools quickly showed that there were plenty of things Nintendo had never done – and just as often, provided convincing arguments for why Nintendo doesn't do them. "The Nintendo level design style is to introduce a new element gently and then give the player progressively more challenging scenarios with it. Along the way, there are many secrets and small side paths for particularly observant players. It's very much the hand of a gentle but playful teacher," says Derek. "On the other hand, players tend to design *Mario* levels with the intention of subverting expectations and offering extra challenges way beyond what you would find in an official level."

Since much of the appeal of the *Super Mario Maker* games comes from experiencing designs that break Nintendo's unspoken rules, it's no surprise to find that those stages dominate the popularity rankings, with few traditional stages making much impact. However, animator Ross O'Donovan does design some of these – often making them hard but fair, to infuriate his fellow Game Grumps on YouTube. "I feel that as new mechanics, obstacles and such are added to the game, it opens up ▶



» [Game Boy] The Game Boy games diverged from common *Mario* themes with use of odd enemies like this spear-dropping guy.

» [SNES] The yellow exclamation mark blocks appear as non-solid dotted lines until Mario activates the appropriate Switch Palace.

» [SNES] Yoshi's appetite is helpful to Mario, as he gobbles up enemies and often recycles them as projectiles.

▲ CHALLENGE-FREE STAGES

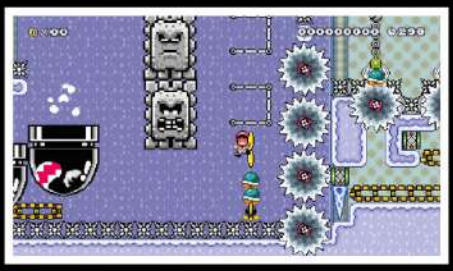
Almost every *Mario* stage, right from 1-1, has been intended to challenge the player. These stages make it very difficult or even impossible to lose a life, instead concentrating on offering the player a different sort of fun, such as mass destruction or fast movement. Unlike auto-Mario stages, they do require interaction.

DE-STRESS LAND!
VVV-G3W-VBG

▲ NARRATIVE STAGES

In stages like this, *Mario* mechanics are warped to fit the designer's chosen narrative. These cover everything from the philosophical nightmare of 'Waluigi's Unbearable Existence' to the weirdness of '1-1.exe has encountered an error', and even funny stages like 'Mario looks for an outhouse', in which our hero needs the loo.

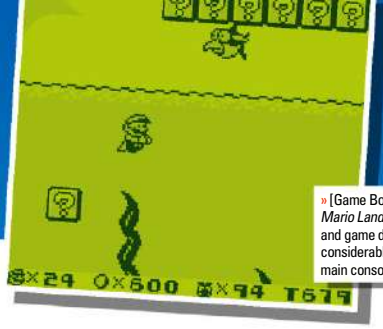
MARIO GOES TO MCDONALDS
K7W-FG2-HFF



▲ KAIZO STAGES

Named after an infamous hack from *Super Mario World*, these stages are typically brutally hard and the design does things that feel unfair, such as starting the player directly beneath a deadly Thwomp. As a result, they typically require trial and error to beat, as well as precise timing and mastery of the mechanics.

SIBERIAN SHELL SUMMIT
BHF-JNW-22H



» [Game Boy] *Super Mario Land 2*'s graphics and game design were considerably closer to the main console *Mario* games.

weird and interesting combinations. So one new deadly obstacle combined with a variety of others can potentially open up many new avenues in terms of level design," he says, in admiration of Nintendo's designs. "I like seeing how they accomplish this and slowly build up the challenges with these obstacles as the levels progress." So how do you make a level like the pros? "I feel that it's important to pick a core mechanic to explore for the level, then find creative ways to expand upon it and have the difficulty gradually increase," says Ross. "Without any sort of cohesion, the level just feels thrown together at random and isn't really rewarding gradually mastering any given obstacle. Find something you want to explore and stick to it!"

Though it's hard to make great levels even with such a rich toolset, it's far harder to build an original platform game, and many of our interviewees have done just that. "*Commander Keen* was very similar to *Mario* in several ways, purposefully," says John. "We hid secrets all over the place because they're fun to find, just like the *Mario* games. The *Keen* games encourage exploration, but also have lots of puzzles in them with keys, doors and switches. Even using your pogo stick to break stuff."

For Kevin, *Mario* is simply the natural point of reference for the platform genre. "If that's the kind of game you're gonna make, the first thing I would ask myself is, 'What would *Mario* do here?' and quite rightly so. You know if you consider that, then you're going to be going down the right tracks," he notes. "When we recently created *Yooka Laylee And The Impossible Lair*, the team are of course experienced with the 2D platform scene having been heavily involved with the original *Donkey Kong Country*. But what game did we all play when we were rendering DK and Diddy all of those years ago at Rare? What did we all look to for inspiration? Yep – I think we all know the answer to that one!" Chris provides a bit more insight as to what was going on in Twycross all those years ago. "The inspiration from Mario in *Donkey Kong Country* was perhaps more related to the design approach, not just in the physical creation (we'd heard Miyamoto had designed with Post-It notes, and inspired by this Gregg Mayles tried these same little paper tools), but also that we recognised how *Mario* games would implicitly teach the player. So whenever a new enemy or mechanic was introduced, you'd encounter the simplest version first, with later encounters adding further challenge and complexity."

Derek aspires to match something quite different. "One thing I studied closely while working on *Spelunky* were the little touches in modern *Mario* games – the 'poofs' that appear when *Mario* runs, the sparkles that appear when he grabs a coin, etc. When we think of game design, we often think of mechanics and levels, but game design includes everything in a game," he explains, highlighting the level of polish that is common in *Mario* games. "For me, a big reason why *Mario* is so enjoyable are those flourishes that we're not always conscious of but we definitely feel as we play."

Of course, designers have to walk a fine line between borrowing *Mario*'s best elements and making something meaningfully different, and Ste is a strong advocate of this approach as evidenced in the design of *Plok*. "We definitely had the idea of mocking *Mario*, gently at least, with things like the buried flags at the end of each level on the first island, and we were obviously influenced in a general way, but we definitely consciously tried to be different," he explains. "We've never been comfortable with ripping off other games, so once we'd decided to make a game in *Mario*'s genre that was as close as we wanted to get, and after that we tried to be a little bit different. I think we were more concerned with trying to match *Mario*'s level of quality and polish rather than with taking specific ideas. The fact that Nintendo borrowed (or coincidentally came up with the same ideas as us, a little bit later on) from *Plok* in *Yoshi's Island* shows that we were on the right track in terms of quality and ideas."

Commander Keen had its own points of divergence, too. "We broke with *Mario* design tradition and didn't have any forced-progression levels where the level is constantly scrolling and you're trying to deal with it," says John, though he notes that differentiation was never a conscious goal. "If something from *Mario* made *Keen* better, we absolutely wanted to use it. We never said, 'Don't do that because it's like *Mario*.' Quite the opposite." Differentiation was also achieved unconsciously in *Donkey Kong Country*, as Chris explains. "The *Donkey Kong Country* titles did take a 2.5D approach as opposed to the pure 2D side-on in *Mario*, but that was less of a *Mario* differentiation choice and more a choice because it would better present the prerendered visuals and allow competition with other visually impressive platformers such as *Aladdin*."

But while plenty of great platform games have come and gone, none have matched the long-term success and impact of the plumber's adventures – and if anyone's going to neatly encapsulate why, a veteran wordsmith like Julian is the man. "Each new 2D *Mario* game built on the foundations of its predecessor by introducing fun new game mechanics and systems that made them even more addictive and entertaining," he says. "Indeed, going back and playing the original *Super Mario Bros* after experiencing the likes of *Super Mario Bros 3* and *Super Mario World* makes the original game feel quite basic. Brilliant though *Super Mario Bros* is, it just seems simple in terms of its gameplay after you've spun, flown, climbed, flung vegetables and generally explored the far richer worlds of its successors. But the thing is, while those newer games added additional layers of sophistication to their gameplay, none lost sight of what makes the series so fun to play. They didn't deviate from the fundamental formula that makes *Mario* games so distinctive – which is superb and highly addictive platforming action."

» [DS] Smashing through the world as Mega Mario was great fun, though it didn't ultimately add too much value.

» [Wii] Simultaneous multiplayer has been a rarity in 2D *Mario* games, but *New Super Mario Bros Wii* focused on it heavily.

» [3DS] *New Super Mario Bros 2*'s key gimmick was a coin extravaganza, the novelty of which soon wore off.

AN EXTRA DIMENSION

DESPITE BEING A 3D GAME, SUPER MARIO 64 HAD A HUGE INFLUENCE ON THE MODERN MOVES THAT MARIO CAN PULL OFF IN HIS 2D ADVENTURES

TRIPLE JUMP

New Super Mario Bros first imported this move, which enables Mario to gain extra height by pulling off a succession of three well-timed jumps – the last of which elicits a gleeful "woohoo!"from the hero.

WALL JUMP

The *New Super Mario Bros* implementation of this move has more in common with *Super Mario Sunshine* than *Super Mario 64*, as Mario can slide down the wall before jumping.

GROUND POUND

Mario originally borrowed this move from his dinosaur pal Yoshi, and it went 2D in *New Super Mario Bros*. Mario can slam directly downwards mid-jump, in order to break blocks and defeat enemies.

CROUCH JUMP

Better known as the backflip, this debuted in 2D *Mario* games as part of the *Super Mario 3D World* style in *Super Mario Maker 2*. Crouch for a while before jumping for some extra height!

LONG JUMP

This self-explanatory move, like the crouch jump, arrived as part of *Super Mario Maker 2*'s *Super Mario 3D World* style. Unlike the 3D games, you can just press R while running – no need to crouch first.

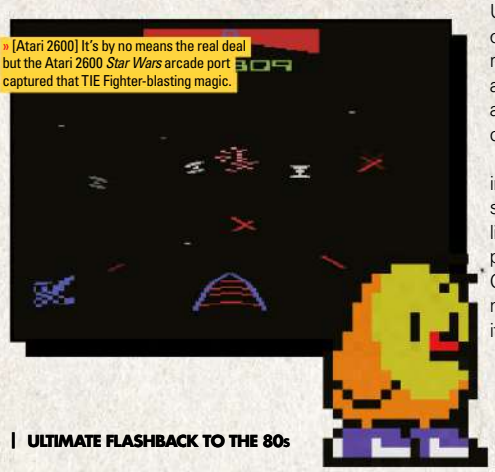
FLASHBACK

CONVERSION CAPERS

WHEN THE ATARI VCS SPACE INVADERS SOLD IN ITS MILLIONS IN 1980, IT DEMONSTRATED A DEMAND FOR COIN-OP CONVERSIONS. THIS PEAKED IN THE MID-EIGHTIES, WHEN PUBLISHERS FOUGHT FOR THE HOTTEST ARCADE LICENCES, AND THE TREND REMAINED STRONG UNTIL THE DECADE'S END

WORDS BY RORY MILNE

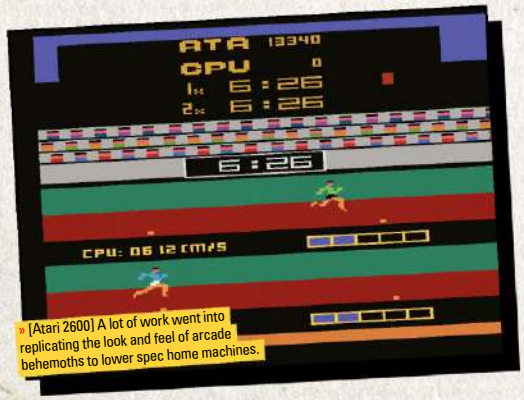
While Atari's *Pong* wasn't the first arcade videogame, it was the first that was considered a commercial success. Two years after its 1972 release, it became possible to miniaturise its tech and fit it into a console, and in 1974, Atari did just that. Soon after its late-1975 launch, Home Pong proved as popular as the machine it had been converted from, and Atari's 1977 follow-up console, the VCS, followed its lead. Five of the nine cartridges initially available for the VCS adapted Atari arcade hits, including the fixed-shooter *Air-Sea Battle*, which converted *Anti-Aircraft*, and the two-player competitive shoot-'em-up *Combat*, which incorporated a version of *Tank*.



» [Atari 2600] It's by no means the real deal but the Atari 2600 *Star Wars* arcade port captured that TIE Fighter-blasting magic.

Of course, creating conversions of popular coin-ops for its console was an obvious step for Atari to take. After all, arcade games were proven concepts that were bound to go down well with home gamers, and Atari's hugely successful adaptation of Taito's *Space Invaders* in 1980 served to underline this point. However, developers of home computer games in the early Eighties typically didn't have Atari's advantages. They didn't hold the rights to hit coin-ops and couldn't afford to buy them. Some produced conversions anyway, making minor thematic and title changes in the hope of avoiding legal trouble. However, an exception was made to this practice in one case by Atari. It owned the US home rights to *Pac-Man*, while Commodore owned the home rights in Japan. When Commodore released its Japanese VIC-20 *Pac-Man* conversion as *Jelly Monsters* in the US and Europe, Atari sued and won, and this and other cases swiftly ended the coin-op clone era.

Authorised coin-op conversions began to appear in earnest on consoles in 1982, as developers started to see the obvious benefits of securing licences for popular arcade games. Atari's VCS port of *Pac-Man* sold over eight million copies, and Coleco's VCS *Donkey Kong* adaptation sold four million. Parker Brothers achieved impressive sales with its version of *Frogger* soon after, and the following year, its console *Q*bert* was another hit. UK home computer game developer Ocean followed suit in 1984 with its middling take on the arcade platformer *Hunchback*, but it did much better when it adapted the run-and-gun *Gryzor* and the military lightgun game *Operation Wolf* later in the decade. Its subsidiary Imagine impressed during the mid-Eighties with the popular beat-'em-ups *Yie Ar Kung Fu* and *Renegade*, and Ocean's rival US Gold did well with its ports of the combat driving game *Spy Hunter* and the *Dungeons & Dragons*-inspired *Gauntlet*. Meanwhile, Elite Systems had hits during this time with its adaptations of the medieval run-and-gun *Ghosts 'N Goblins* and the charming pseudo-platform game *Bomb Jack*.



» [Atari 2600] A lot of work went into replicating the look and feel of arcade behemoths to lower spec home machines.

» [ZX Spectrum] *Operation Wolf* on the ZX Spectrum stands out as one of the most impressive conversions of the Eighties.

» [BBC Micro] Some conversions, such as *Yie Ar Kung Fu* on the BBC Micro translated pretty well graphically.

» [Atari 2600] *Pac-Man*'s Atari 2600 conversion was kicked about by critics but it fared much better with the wider public.

The competition for these prized arcade licences intensified as the decade progressed, with even modestly well-reviewed home computer coin-op conversions guaranteed to make a decent profit, especially if they were released in the months before Christmas. Towards the end of the decade, adaptations of arcade titles were pretty much the only 8-bit home computer games selling at full price, with original games largely being budget fare. During these years, conversions of the cop chase arcade title *Chase HQ* and the coin-op racer *Turbo Out Run* wowed 8-bit home computer owners.

As these systems reached the end of their commercial lifespans, the NES, Sega Master System and PC Engine consoles were making inroads into the west. The latter two systems were best known for their arcade adaptations, with Sega's system boasting must-play titles like the sprite-scaling racer *Out Run* and space shooter *Galaxy Force*, and Hudson's machine offering seemingly perfect adaptations of the coin-guzzling brawler *Vigilante* and the slick shoot-'em-up *R-Type*.

There wasn't a complete capitulation from home computers in the face of this competition, however, as the 16-bit ST and Amiga could replicate coin-ops far more faithfully than their 8-bit predecessors, and the arcade ports they received were at times more accomplished than those on consoles. In the last year of the decade, impressive Amiga versions of the arcade platformers *The New Zealand Story* and *Rainbow Islands* appeared, the second of which was almost identical to the coin-op.

Looking back to the mid-Eighties high point of coin-op conversions, it's clear that home computer and console owners wished they had arcade games in their homes, but would settle for adaptations that distilled the essence of those cutting-edge machines onto far less capable hardware. The beauty of the most accomplished examples of this compromise was that they gave Eighties home gamers the same feeling that they got in the arcades, even if they fell far short of being arcade perfect. ✱

» [PC Engine] The PC Engine often wowed gamers with stellar, almost arcade-perfect conversions.

AMAZING ADAPTATIONS

THE PORTS THAT PUSHED THE LIMITS OF THEIR HOST SYSTEM

BUGGY BOY (C64)

▶ There are concessions, of course, with the C64 version of *Buggy Boy*, but these are mainly that its graphics are smaller and less well-defined than the original's. Visuals aside, this polished port has all of the speed, collectables, ramps and level designs of the arcade racer.

R-TYPE (ZX SPECTRUM)

▶ The Spectrum has no right hosting a faithful take on *R-Type*. Monochrome visuals would have been understandable, but instead, it's a riot of different hues. Just as importantly, the coin-op's iconic foes, big bosses, confined levels and intense blasting are all there.

GALAXY FORCE (MASTER SYSTEM)

▶ Considering *Galaxy Force* was designed to showcase bleeding-edge arcade tech, it's amazing how the humble Master System captures its essence. This is especially true of its renditions of the coin-op's challenging tunnel sections, but it also adapts its frenetic firefights well.

CHASE HQ (AMSTRAD CPC)

▶ The Amstrad wasn't built for arcade racing game conversions, but it boasts a brilliant port of the combat racer *Chase HQ*. Its smooth sprite scaling and sensation of speed defy its host hardware, and it fits in all the coin-op's nice touches, like the turbos, speech and humour.

RAINBOW ISLANDS (AMIGA)

▶ Watch the original version of the colourful platformer *Rainbow Islands* running alongside the Amiga port and you would be forgiven for not seeing any difference. The acclaimed home computer conversion really is that good, with only its slightly less-dynamic music falling short.

© Getty

Space Harrier

» **DEVELOPER:** Sega » **YEAR:** 1985 » **COST TODAY:** £5,000 (stand-up version)

Yu Suzuki doesn't do things by half measures. When he has an idea for a videogame, he commits to it and he does everything he can to ensure that his vision becomes reality. Look at the unlikely resurrection of *Shenmue III* if you need any proof of his drive and commitment.

When Suzuki conceived *Space Harrier* in 1985, he created it from the very finest components – which included a main CPU featuring two MC6800s running at 10MHz, and a Z80 for audio that ran at 4MHz. He built on the 'Super Scalar' technology that had first featured in *Hang On* and ended up naming the actual arcade board after his game. It was a beast of a board, capable of performing incredible feats of graphical trickery, so it stands to reason that the cabinet that housed all that power needed to be just as impressive.

And impressive *Space Harrier* most certainly is. Realising that standing is for chumps, Suzuki and his team created an elaborate sit-down hydraulic cabinet that threw the player about with gleeful abandonment as they shot down hordes of enemies, while the game's glorious soundtrack boomed out of its strategically-placed speakers. It was an epic experience in 1985 and remains just as thrilling today. As we said, Yu Suzuki doesn't do things by half measures… ✱

STANDOUT MOMENT **Dragon Riding**

While virtually every boss encounter in *Space Harrier* is a memorable experience, one of the best parts of the game happens upon completing its fourth stage. After dispensing with a group of mechs there's a change in music and you're instantly transported into *Space Harrier*'s fantastic bonus stage. The Harrier jumps onto the back of a furry dragon (Yu Suzuki got the idea from *The Neverending Story*) and uses it to smash down as many trees as possible. A terrible idea today, from an ecological standpoint, but absolutely thrilling in 1985.

Space Harrier fact

■ In addition to the stunning hydraulic cab that's the focus of our spread, Sega also released a static sit-down deluxe cabinet of *Space Harrier*, as well as a basic upright version.

THE LEGEND OF ZELDA

STALFOS

Nintendo's masterpiece has enthralled us for almost 40 years. The original Legend Of Zelda isn't just an important piece of history but it's also a game that's still great to play today

WORDS BY ASHLEY DAY

OLD MAN

You really have to hand it to Miyamoto and his band at Nintendo. To make one of the greatest and most important videogames of all time, in the shape of *Super Mario Bros*, was one thing. But to repeat the same trick just a year later, and in a completely different genre, is just incredible.

In fact, there isn't even a year between *Super Mario Bros* and *The Legend Of Zelda*. There were only five months between the Japanese release dates of each game, yet the latter represents a giant stride from the former in terms of game design. Where Mario was brilliantly simple, placing you at the start of a linear journey and merely asking you to move a little plumber to the right, *Zelda* offered a world of possibility by comparison.

KEESE

Starting off in the middle of the vast land of Hyrule, it put you in control of an elf-like boy named Link, with three possible exits standing before him, and then… did nothing. No instructions, no dialogue and no hints. Just the promise of adventure and an invitation into the unknown. Which way should you go? Well, that was entirely up to you, and that was the entire point of the game. There was an ultimate goal, of course – to collect the eight scattered pieces of the Triforce Of Wisdom, defeat the evil warlord Ganon and rescue the titular Princess Zelda – but it was the open nature of how you approached this task that really made *The Legend Of Zelda* so compelling.

It's a well-known story that Miyamoto's inspiration for *Zelda* came from his childhood memories of exploring the Japanese countryside without a map and the pleasure that he got from discovering places he had no previous knowledge of. The goal of the *Zelda* project

LINK

LIKE LIKE

» The beginning moments are some of the most difficult. That tiny life bar won't get you far!

» You're not told where to go, so it's up to you to locate and clear the game's dungeons.

» Mercifully, if you die in a dungeon, you'll be placed at its beginning and not the start point in the overworld.

ZOL

was to capture that childlike fascination with the unknown, the sense of wonder that the world can provoke when everything around you is so new and unusual. And that project also happened to fortuitously coincide with the development of the Famicom Disk System, Nintendo's Famicom add-on that side-stepped the rising cost of ROM chips and allowed developers to create much bigger games than before.

The Disk System's re-writable media also allowed for game progress to be permanently saved without the need for cumbersome passwords, and this was a crucial technological advantage that enabled Nintendo to further distinguish its console games from those of the arcades. Coin-operated arcade games were still the dominant form of videogaming in 1986 and were focused very much on short-term challenge, cyclical and repetitive gameplay, and the thrill of chasing a high score. But Nintendo wanted its games to be something different; something you played over a long period of time, returning to like a good book to enjoy an ever-evolving experience; a journey, rather than the same few setup over and over again.

This is very much how the modern videogame can be described over 35 years on, of course, but *The Legend Of Zelda* was one of the first games to truly offer that kind of deep, long-term experience. And it did it very well indeed. So many early videogames can be credited as the first to do one thing or another, but *Zelda* did it all, establishing the rules of the modern adventure game in such a style that, alongside its sequels, it remains brilliantly fun almost four decades later, while Nintendo's competitors were still playing catch-up.

It's not just the tantalising nature of Hyrule's open world that makes *Zelda* so appealing. It's the way Link's ever-increasing inventory and abilities open up new routes through that world, ensuring that it rewards progress with a steady stream of surprises and discoveries right up to the end. There's the contrast between the freedom of the overworld and the tightly focused structure of the dungeons beneath the ground. There's the way each weapon Link acquires has more than one obvious use, forcing you to experiment and be creative with the way you play. And, of course, there's the wealth of secrets ▶

INSTANT EXPERT

■ *The Legend Of Zelda* is the most nonlinear adventure in the series, even compared to *Breath Of The Wild*. You can tackle the dungeons in almost any order you like, and the game can be finished without ever collecting the sword.

■ It was the first NES title to sell over a million copies and went on to sell 6.5 million in total.

■ Though the map for *Zelda*'s third dungeon resembles a swastika, it is actually the much more innocuous manji, an ancient religious symbol used by Japanese Buddhists, which is the reverse of the infamous emblem and is common in Eastern philosophy.

■ Link is an unusual hero in that, in the first game and canonically throughout the series, he is left-handed. Perhaps by coincidence, the word 'links' is German for 'left'.

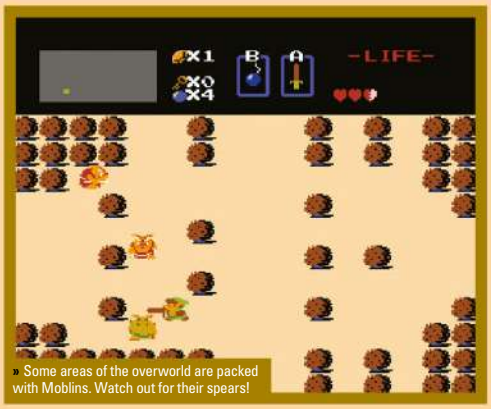
■ Complete *The Legend Of Zelda* and you can play a second quest with different dungeon layouts and item placements. If you want to skip straight to it, enter your name as 'ZELDA' at the start.
Princess Zelda is named after Zelda Fitzgerald, wife of novelist Francis Scott Fitzgerald.

■ When *Zelda* arrived in the US and Europe, it was ported from disk to cartridge and became the first console game to include a battery to store save data.

DODONGA

MOBLIN

LEEVER



» Some areas of the overworld are packed with Moblins. Watch out for their spears!

that permeate the world, not just rewarding the player but encouraging them to dig deeper, play harder and uncover hidden treasures that make you feel like the best player in the world. It's a deeply personal feature that makes you feel special for finding those secrets and personalises the experience, even though those secrets are, in reality, accessible to everyone.

With almost four decades under its belt, the *Zelda* series has since gone from strength to strength, and many people have a favourite entry in the series that isn't the first one. *A Link To The Past*, *Link's Awakening*, *Ocarina Of Time* and *Breath Of The Wild* could all legitimately lay claim to the title of 'Greatest *Zelda*', but there's something pure about that first game that sets it apart from its successors. Right from *Zelda II* onward, the series began to change. It still retained the core features of an overworld, a series of dungeons and an expanding bag of tricks, but it also lost something along the way. As the series has become increasingly preoccupied with telling a story, you could argue that it has also limited itself, weighing its opening moments down with unnecessary dialogue and lengthy tutorials that actually distance you from Link instead of doing the opposite.

» This dragon boss is pretty easy to vanquish: just lay a few bombs at its feet and you'll be on your way to a Triforce piece.

The Legend Of Zelda's real brilliance is that it has the confidence to just drop you into its world and leave you to explore, experimenting with its mysteries without any real hand-holding. Instead of simply telling you a story, it allows you to live the adventure; its events are driven by your decisions and actions. It feels unique, it rewards those who jump in at the deep end to go see what they can find, and it's a quality that the *Zelda* series would do well to nurture as it evolves.

ARMOS

POWER-UPS

Some of The Legend Of Zelda's pick-ups have endured throughout the series' history, while it never quite happened for others…

Bait
This meat is bought from a shop and used to feed any Goriyas that block your path.

Bombs
The bomb can be used to hurt just about any enemy but can also be used to blast open secret entrances.

Boomerang
The boomerang has two uses. One to damage enemies, the other to retrieve distant objects.

Bow
The bow is the only thing that can kill Ganon, at least once you've acquired the silver arrows for it.

Candle
This can light your way, but it can also be used to burn bushes, sometimes revealing secrets.

Ladder
This item allows you to cross sections of river to take shortcuts and is essential for some dungeons.

Magic Book
An optional item that upgrades the wand so that it can shoot fireballs, making candles redundant.

Magic Wand
It's a magic wand! What more do we have to tell you? It uses your magic energy to shoot beams.

Potions
Potions come in two varieties: blue and red. Blue restores some of your life while the red replenishes it all.

Raft
Allows Link to get around the waterways of Hyrule. He can embark or disembark the raft at any dock.

Rings
These, much like other magic items, can be found in two colours. Each increases Link's strength.

Shield
The wooden shield just repels ordinary attacks. The magic shield, however, can block fireballs.

Swords
There are three swords – Wooden, White and Magical – each one more powerful than the last.

Whistle
A single-use item that is essential for beating Digdogger, the boss of the fifth dungeon.

VIRE

MEMORABLE MOMENTS

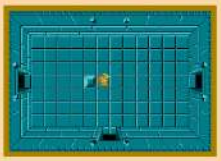
We present the best bits of Link's first adventure

Signature tune

The now-iconic *Legend Of Zelda* theme slowly plays and builds up speed as a waterfall pours down the title screen. Koji Kondo's composition is yet another classic, leading to his involvement in every game in the series up until *Ocarina Of Time*.

Good advice

One of the few pieces of dialogue is also the most memorable. Though you can play the whole game without a sword, the old man's advice is right. You'll do much better with it, and what's a *Zelda* game without a sword? Later, you can obtain more powerful weaponry.

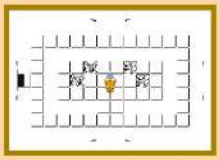


Secret exit

Finding secrets is one of *Zelda* series' greatest pleasures, not to mention one of its inspirations, and here's one of the earliest you can find in the game. A door without a keyhole is opened by pushing a seemingly ordinary block to the left.

Fairy godmother

Find an enclosed pool and a fairy will pop out and rejuvenate Link's health with a swirl of hearts. It's another feature that has cropped up time and again through the series, with the fairies' abilities and applications expanding as the games have evolved.



Triforce get!

Link finds his first piece of the Triforce and holds it above his head in a way that has now become an identifiable characteristic of the little lad. The Triforces of Wisdom and Power appear in the original, with Courage debuting in the next.

Side story

Some dungeon screens switch perspective to a side view, a trick that was adopted wholesale for *Zelda II: The Adventure Of Link* and would return for some brief sequences in the Game Boy's *Link's Awakening*.

Hard to swallow

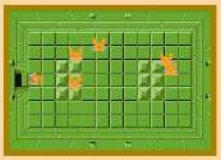
The brilliant Dodongo boss is defeated by getting him to eat and swallow a bomb, causing him some nasty indigestion when it explodes in his belly. A similar boss, King Dodongo, became an iconic sequence in *Ocarina Of Time*.

Hidden stairs

Another great secret. Touch a statue and it will come to life to attack you. Some statues stand over stairways that lead to secret underground rooms, tempting players to engage them in combat in the hope of some reward.

Boss hog

The final showdown with Ganon reveals him to be some kind of grotesque demon pig, much more monstrous than the humanoid reinterpretation in *Ocarina Of Time*. Recent games tend to give him a hideous second form.



Loud noises!

In the Japanese release of *Zelda*, you can shout into the Famicom microphone to hurt Pols Voice enemies. But you can't in the western NES release. So in Japan it's a memorable setpiece. Over here, it's barely even a regular moment.

Feeding time

This Goriya isn't having a moan. Strangely, that noise is actually his stomach rumbling. Feed him some meat and he'll let you pass. The first time a *Zelda* enemy defies expectations of simply being sword fodder and not the last.

WIZZROBE

AQUAMENTUS

ZELDA

GANON

POLS VOICE

LEEVER

TEKTIKE

Amiga 500

» **MANUFACTURER:** Commodore » **YEAR:** 1987
» **COST:** £499 (launch), £150 (today, boxed), £75 (today, unboxed)

The Amiga 500 was by far the bestselling model from Commodore's Amiga line, but it was very nearly *Atari's* Amiga line instead. The story begins in the early Eighties when Amiga Corporation was established as a peripherals manufacturer, but this was a front: in secret, the company was developing a powerful 16-bit chipset, codenamed 'Lorraine'. In 1983, Amiga Corp signed a contract with Atari to secure more funding with the promise to deliver three chipsets by the end of June 1984, at which point Atari would sign a licensing agreement with the company. However, Amiga CEO David Morse began negotiations with Commodore, and instead of delivering the chips at the end of June, Morse delivered a cheque for $500,000 to repay the Atari loan. The money was supplied by Commodore, which bought Amiga Corp soon afterwards.

The first Amiga computer was the expensive, business-focused Amiga 1000 in 1985, but the cost-reduced Amiga 500 was the real hit and outshone its Atari ST rival in terms of graphical prowess. A price drop to £399 in 1988 helped to boost sales, along with the introduction of the popular Batman Pack in 1989 that included the games *Batman*, *F/A-18 Interceptor* and *The New Zealand Story*, along with Deluxe Paint II. The 500 was superseded by the short-lived Amiga 500 Plus in 1991, which was followed by the much-maligned Amiga 600 in 1992, and Commodore declared bankruptcy two years later. ✱

Amiga 500 fact

■ Amiga Corporation co-founder and lead engineer Jay Miner also designed the TIA chip in the Atari 2600, as well as the ANTIC, CTIA and GTIA chips in Atari's 8-bit home computers.

RAM: 512 KB
PROCESSOR: MOTOROLA 68000 @ 7.16 MHZ (NTSC), 7.09 MHZ (PAL)
MEDIA: 880 KB FLOPPY DISKS
AUDIO: FOUR 8-BIT CHANNELS
COLOUR: 4,096 COLOURS
DISPLAY MODE: 320×256, 640×256 OR 640×512

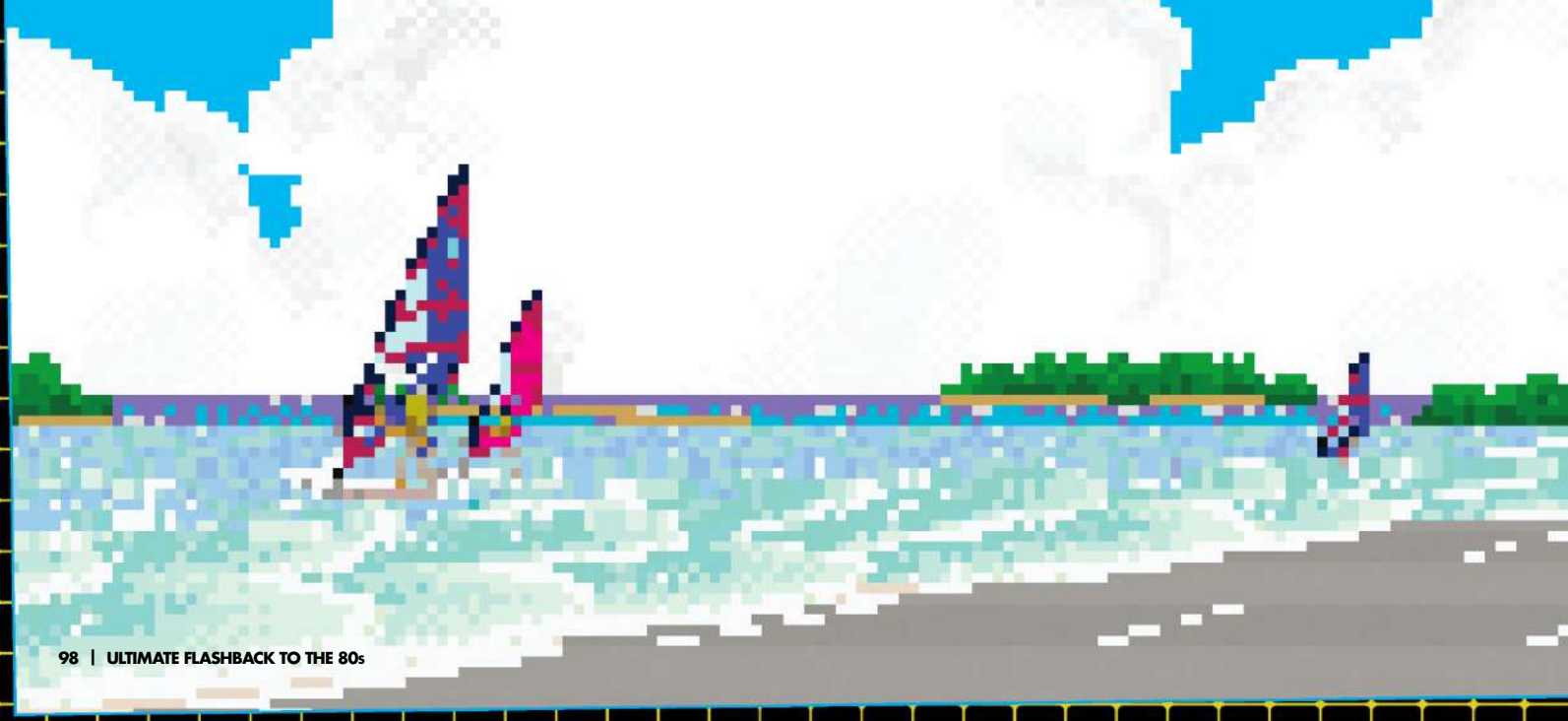
EDITOR'S CHOICE

Stunt Car Racer

The Amiga 500 games scene properly ignited in the Nineties, but in terms of Eighties games, *Stunt Car Racer* from 1989 is the clear highlight. Created by Geoff Crammond, the genius behind *The Sentinel* on the BBC Micro, *Stunt Car Racer* embraced 3D visuals at a time when most racing games still used 2D sprites, and the looping, vertiginous tracks provided some serious thrills as you careened off impossibly high jumps. The game was originally coded for the Commodore 64, but the superior Amiga conversion added character portraits and more colours, as well as the ability to link two Amigas together to race head-to-head with a friend.

The Road Trip of a Lifetime

Out



Run

Sega's iconic Eighties racing series has delivered on a fantasy only seen in car adverts – high speeds, beautiful scenery and an equally lovely companion. Let's hop in the driver's seat and tear down memory lane

Words by Nick Thorpe

Envy is not a pretty thing, but we've never claimed to be flawlessly beautiful – and we're not sure we've ever felt greater envy than when we happened across a nice red Ferrari parked just a few doors down from our home. The lucky driver that owned it could just swan off somewhere beautiful at a moment's notice, probably at high speed and almost certainly with an attractive passenger, while we'd have to continue the dreary door-to-door leafleting task that had brought us to the owner's house. Needless to say, we were green enough to be mistaken for a certain Bruce Banner.

Luckily for those of us who employ a more modest means of transportation, Sega has spent many years bringing us the *OutRun* series, and thus the chance to enjoy the fantasy scenario we had envisioned for that local motorist. "*Out Run* is not an endurance, battle-against-the-clock racing game, but rather a driving game akin to a Sunday drive with beautiful scenery rolling past," says Yu Suzuki, *Out Run*'s director and a noted motoring enthusiast. The original ▶

Out Run

» [Xbox] Coast 2 Coast is an excellent mode that's chocked full of challenges to complete.

» [Arcade] Police will try to ram you off the road and generally hinder your efforts in *Turbo OutRun*.

inspiration for *Out Run* was *The Cannonball Run*, the 1981 comedy film depicting a cross-country race across the USA, but having been told that scenery in the US isn't tremendously varied Suzuki instead went to Europe.

"Doing research for the game, we rented a car in Frankfurt, and drove the Romantic Road (Romantische Straße), the French Riviera, through the Swiss Alps, Florence, and Rome to name a few stops along the way," recalls the veteran director. Some amusing incidents made it a journey to remember, too. "We stopped at Trevi Fountain along the way, where my superior says, 'Face away from the fountain, and we are going to throw our coins in at the same time. Got it?' So, okay, we did. I am guessing he saw it done in a movie one time, so he said we had to do it," Suzuki recalls. "I come to find out later on, when two people face away from the fountain and throw coins in at the same time, they are to be wed."

AM2 was at the forefront of arcade development throughout the Eighties and its two previous hits, *Hang-On* and *Space Harrier*, were both graphically impressive and housed in attention-grabbing cabinets. *Out Run* was given the same treatment – not only did it employ the same sprite-scaling technology as the previous games, the deluxe cabinet could sway left and right to give the sensation of movement. The result was that it was the kind of game that made an immediate impression. "I think it was probably the summer of 1987 and it was pretty mind-blowing for me," remembers Patrick Michael, head of research and development at Sega Amusements International. "I think it was my first experience of a moving cabinet and my first branching stage driving game. It was all about the summer, blue skies, great tunes, a convertible and a beautiful woman by your side."

Steve Lycett, designer on the Sumo Digital's conversion of *OutRun 2* and producer of *OutRun 2006: Coast 2 Coast*, was similarly impressed. "I'd already been blown away by *Space Harrier* (especially the deluxe hydraulic version!) so when I saw *Out Run*, which was even more impressive, and let you drive a Ferrari, how could I not fall in love? Of course, back then I was rubbish at it, never touched the brake and just set gears to high, but even then, it was just fabulous soaking up the drive, the music and the scenery." Sean Millard, creative director at Sumo Digital and senior designer on the home version of *OutRun 2*, was also amazed by the hardware. "The sit-in cabinet was an exciting proposition and added to the thrill of the game. To then enjoy the game as much as I did and to find it so accessible, meant that it became my go-to arcade game."

Your objective in *Out Run* is to reach each checkpoint before the time limit expires. The only choice you have to make, save for picking your music at the beginning of the game, is which way to drive at junctions. Other than that, it's about driving fast and not crashing, and this simplicity was core to its appeal. "It was so accessible, bright and *fun*… it was way less intimidating than *Pole Position*," says Sean. "I remember watching an older kid playing it and using the gear to drop speeds for the first chicane by the beach huts and suddenly, there was a junction! I don't think I'd seen choice like that in a game before," Steve recalls. "Suddenly, the course map on the machine made sense, you could go where you wanted!"

When asked what the hardest part of development was, Suzuki replied "To make the driving experience as fun as possible," which is a surprising admission about a game that is virtually synonymous with fun. "To achieve that, we widened the roads, and put a lot of work into the buildings and ground splatter to ramp up that feeling of going fast," he explains. "We also had the idea of putting in the radio to make it enjoyable. The key term here is 'superiority complex'."

Out Run was an *enormous* success for everyone involved. Sega sold 30,000 cabinets, making it the company's bestselling arcade game of the Eighties. When the home conversions arrived, despite failing to keep up with the technologically advanced arcade game, they did similarly well. US Gold managed to shift over a quarter of a million 8-bit computer copies in time for Christmas in the UK alone, making it the bestselling game of the year. Sega and US Gold spent the next few years bringing *Out Run* to a variety of formats including consoles and the 16-bit computers. Notable later conversions include the *Sega Ages* version on PlayStation 2, which includes polygonal graphics and a new Arrange mode with a diamond-shaped course and rival racers, and the 3DS version which includes stereoscopic 3D visuals and new music.

Did you know?

■ *Out Run* was originally designed to include motorbikes and oncoming vehicles amongst the traffic.

Even the best arcade games eventually see a drop in earnings, and while that process took a few years for *Out Run*, eventually a successor was needed. That need was fulfilled in 1989 by *Turbo OutRun*, a radical overhaul which could be installed as an upgrade kit in original cabinets. The core concept of driving a Ferrari with a beautiful woman as a passenger hadn't changed, but practically everything else had – starting with the location and format. Where the original game gave players the freedom to choose their route through a series of stages inspired by Europe, *Turbo OutRun* was a linear cross-country race across the USA.

Greater elements of danger and competition were added, in the form of police pursuits and a rival racer who could steal your girlfriend if he beat you to checkpoints. That wasn't all – on-track

> **“It was probably the summer of 1987 and it was pretty mind-blowing for me”**
> Patrick Michael

hazards, such as barriers, were there to impede your progress, and adverse weather conditions including rain and snow were included. To cope with all of this, your car – this time modelled on an F40 – could be upgraded, taking on three new parts over the course of the game. What's more, a turbo button was added – perfect for pulling ahead of the rival or ramming through barriers. If *Out Run* resembled a car advert, *Turbo OutRun* was closer to an action film.

There was no question that *Turbo OutRun* was a good game, but whether or not it was a good sequel was a matter of personal taste, determined by how you saw the new mechanics. “I liked them; they felt like they added to the action without breaking anything,” says Sean. “I wiled away many happy hours on my Amiga with *Turbo OutRun*.” Not everybody was so enthusiastic about them, though. “To be honest, I always preferred the original game and its sense of freedom,” says Steve. “What was refreshing about *Out Run* was more it was you versus the clock, the traffic was merely obstacles. *Turbo OutRun* felt like a step back, you lost the freedom, the police were a hindrance, the turbo charge, while fun to use, could land you in a lot of trouble and worse still, it rained!” Patrick feels similarly. “I can't say that I was a big fan, it added a lot of complexity with the turbo with the overheat mechanic and the upgrades system. For me, the simplicity of the original was more enticing.”

Between 1989 and 1991 three more home-exclusive *OutRun* games were devised, but if you

were outside of Europe, they probably passed you by. The first of these was *Out Run 3-D*, a rather good remixed Master System conversion of the original game with 3D glasses support, new graphics, revised stages and even three pretty good new tunes to pick from. The Master System was dead in Japan and the North American release was cancelled due to low 3D game sales, so it only hit Europe and Brazil. *Battle Out Run* was another Master System exclusive, and another oddity. Sega's Master System developers put together a game that was obviously heavily inspired by Taito's arcade hit, *Chase HQ*. In each of the eight US-based stages, players were tasked with chasing down upgrade trucks to trick out their car, then catching up to a criminal and ramming them off the road. It received a warm reception from the press in spring 1990, but players were advised to wait for the official conversion of *Chase HQ*.

Lastly, there was *Out Run Europa*, which wasn't produced by Sega at all, but instead by US Gold. Having produced the home computer conversions of the two coin-op games, the publisher had secured an agreement to make a sequel of its own. Combat was once again a major element of the game, which cast you as a secret agent chasing down enemy spies in a cross-continental ▶

» [Arcade] Major crashes are a big part of *OutRun* history, often sending the car into the air.

» [Master System] *Out Run 3-D* is now a sought after rarity, due to its improvements over the original.

» [Arcade] Failing to reach a checkpoint ahead of your rival ensures your fickle companion will hop to his car.

Did you know?

■ The Dreamcast and 3DS versions of *Out Run* include a redrawn car sprite to avoid copyright infringement.

Data Discs Interview

We talk to Jamie Crook to find out why Out Run's soundtrack has stood the test of time

When did you first hear *Out Run*'s music? What impression did it make on you?
Probably on the Mega Drive. I grew up in a small town in Devon, so we didn't have access to many arcade machines at the time. It wasn't until much later that I heard the arcade version, which is, of course, the superior one. I had a friend at University, years ago, who used to listen to the *Out Run* soundtrack on a Sony Walkman in between classes. He was always praising it, so I revisited it then, too. It never gets old.

The three main *Out Run* tracks have been remixed and arranged frequently over the years, and they always manage to remain relevant. What do you think gives them this timeless quality?
Hiroshi Kawaguchi is a clearly gifted composer who, despite working in an extremely restricted medium, produced something really special. The tracks are all well structured, with hooks in all the right places and memorable rhythms running underneath. It's just great songwriting. Simple as that.

What was *Out Run* doing differently to other games of the mid-Eighties in terms of its sound and music?
In the Eighties Sega was at the cutting edge in the arcades. Hiroshi Kawaguchi worked with their machines from really early on, which I think gave him an intricate understanding of the technology and its restraints from the outset. Beyond that, I think he also cared deeply about song structure and the pivotal role played by music within the game. It's clear there was a lot of thought put into the music in *Out Run*, which perhaps was missing from other games. The music was always designed to be fundamental to the experience, with each track having its own distinct flavour.

What drove you to release the *Out Run* soundtrack on vinyl?
It's a timeless soundtrack that can be enjoyed as a standalone album, irrespective of whether you're familiar with the game or not. It's just really good music.

***Magical Sound Shower*, *Passing Breeze* or *Splash Wave*? No cop-outs!**
Passing Breeze. That bass-line...

Learn more about classic game soundtracks on vinyl at data-discs.com

chase to Berlin. It was also the first *OutRun* game with different player vehicles. "Starting on a motorbike was all sorts of weird and wrong," Steve recalls, adding, "I'm sure you drive a Porsche at some point too." He's correct, and in fact the Ferrari only appears in the final stage. For the first and only time, players were able to race across the seas and could even fire weapons at enemies. The game launched in 1991 for Europe's major 8-bit and 16-bit computers, as well as the Master System and Game Gear – the latter version also making it to US shores. It received a mixed reception, with the Amiga and Master System versions being considered the best.

The last home-exclusive *OutRun* of the Nineties wasn't originally meant to be an *OutRun* game at all. Sega subsidiary SIMS was working with Hertz to create a futuristic racing game for the Mega-CD titled *Cyber Road*, but by mid-1992 plans had changed, with the project being moved to the Mega Drive and renamed *Junker's High*. Despite this, the game shared some commonalities with previous *OutRun* games – branching paths were in, and there was turbo boost mechanic. Perhaps for these reasons, Sega granted SIMS the use of the *OutRun* licence and picked the game up for export.

However, the game that became known as *OutRun 2019* was also a departure from previous entries in the series. For a start, bridges were a major part of gameplay – for the first time ever, you could fall off the road. Sometimes you'd harmlessly drop down to another road, but you could just as likely fall into a lake. What's more, the colour palette was pretty drab, taking the game further from the summer vibes the series was known for. The game ultimately proved divisive when it released in March 1993. "*OutRun 2019* was more true to the original in gameplay but the *F-Zero*-style theme just did not capture the same warm feeling," recalls Patrick. Critics offered sharply differing opinions – *GamesMaster* dismissed it as a "five-minute wonder" and awarded it a miserable 30%, while *Diehard GameFan* described it as "much better than the original" in a 77% review.

Fortunately, fans didn't have to wait long for another game to appear, as the third arcade *OutRun* game arrived just before the summer of 1993. *OutRunners* was developed by Sega's AM1 team, and returned to the traditional *OutRun* format of blue skies, branching roads and simple driving – the only concession to complexity was the addition of various cars with different transmission configurations, ranging from two to six gears. Even splitting the courses into two sets, the east and west routes, didn't matter much given that both shared quite a few stages. The biggest new feature that *OutRunners* brought to the series was easily the introduction of multiplayer racing. Depending on the number of linked cabinets, up to eight players could compete against each other with the race leader choosing the way at each checkpoint. To accommodate for the increased player traffic, the number of CPU-controlled vehicles was reduced from previous games.

Thanks to the power of the System 32 board, *OutRunners* proved to be the best-looking *OutRun* game yet, with amazingly smooth scaling and very detailed backdrops. The soundtrack featured the original music, revamped by Takenobu Mitsuyoshi, as well as some brand-new tracks, and for the first time, you could switch between them mid-game. The return to a successful formula coupled with new advances sounds like it should have been a guaranteed hit, but *OutRunners* wasn't a particularly successful arcade game.

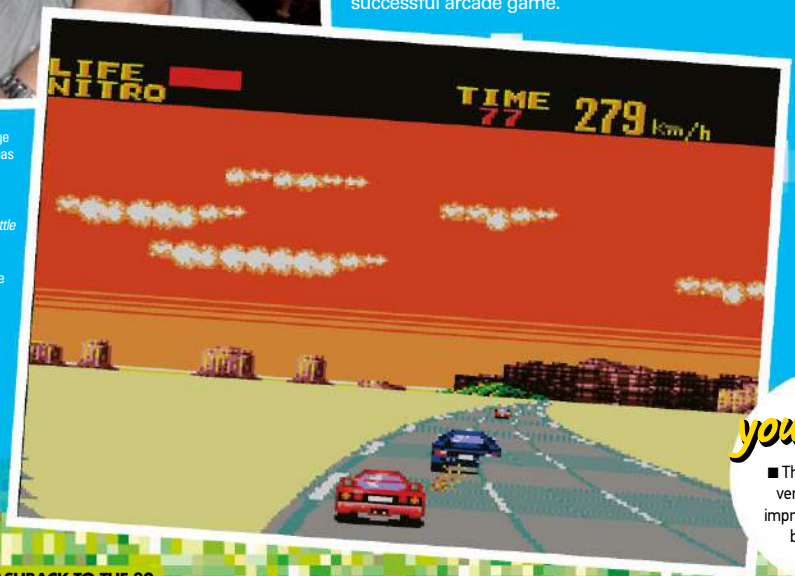
> **"To be honest, I always preferred the original game and its sense of freedom"**
> Steve Lycett

"I think there was a mix of reasons for that," Steve tells us. "First, it was a two-player arcade cabinet only, so it was probably quite expensive for arcade operators at the time. Second, it was around the advent of polygonal 3D racers, released the same year as *Virtua Racing* so likely for many operators, it looked a bit more old fashioned." It's a very valid point – not only was the game sandwiched between *Virtua Racing* and *Daytona USA* in Sega's release schedule, those games also offered the game's key selling point of support for eight-player races. It also had a different tone than previous *OutRun* releases, as Steve notes. "Unlike *Out Run* which played it very straight (mostly!) it also had a very Japanese sense of comedy and look, which I love, but might not have been quite the taste of many western arcade operators!"

Another factor might simply have been that fans weren't ready for a multiplayer *OutRun*. "No doubt it was a great game and the multiplayer was fun but it did not feel right to me," says Patrick. "I was pleased that it came back to a more traditional gameplay after *Turbo*'s complexity, but in my mind *OutRun* was a single-player experience." But even when playing solo, *OutRunners* didn't always hit the spot. "I do remember playing it quite a bit on a Spanish holiday as a single player and enjoying it," Patrick recalls, "but some of the more wacky vehicles and drivers just grated a little." A ropey Mega Drive conversion failed to endear it to the home audience, too.

Following the relatively weak reception of *OutRunners* in both the home and arcade settings, the series went dormant for a full decade. The original game turned up in retro packages such as *Sega Ages Vol 1* and as a bonus on *Shenmue II*,

» Steve Lycett is a huge fan of the series and has been heavily involved with the later ports.



» [Master System] *Battle Out Run* takes place across eight stages, but the differences are mostly cosmetic.

Did you know?

■ The Saturn and 3DS versions of *Out Run* improve on the original by doubling the frame-rate.

Did you know?

■ *Turbo OutRun*'s upgrade shop music uses the same melody as the shop music from *Fantasy Zone*.

The End Of The Road

If you have a favourite route, you might not know Out Run has an ending for each of its goals – and here's what happens in each of them

■ Having reached the end of the game's easiest route, our illustrious driver is hoisted aloft by a crowd of cheering spectators. Unfortunately, they're all easily distracted men. When a pretty lady stops by, they all stop to gawk at her and drop our man. Poor form, chaps.

■ Congratulations, you've driven a long way from home! Commiserations, your Ferrari has broken down. We're not sure where the nearest Ferrari repairer is, but we're guessing that it's nowhere near here. Oh, and it's the Eighties so you probably don't have a mobile phone.

■ What's most important about *Out Run* to you? If it's the female companionship, the middle route is where you want to be. Having been presented with a magic lamp, our driver receives his wish, which turns out to be a harem. Your passenger doesn't look best pleased with that.

■ Will this ending finally play it straight? It seems so, as someone wanders towards you with a trophy for your achievement – only to saunter straight past you and present the trophy to your companion. Hang on a minute... was the steering wheel on the right, then?

■ For the master driver that reaches the most difficult of *Out Run*'s goals, there is no joke or calamity – you're presented with a well-deserved trophy for your, frankly, excellent driving. Now you've truly mastered the original *Out Run*, it's time to try one of the sequels...

Out Run

La Scuderia Rossa

OutRun has always been most closely linked with Ferrari – and here's every model featured in the series

250 GTO
Introduced: 1962

Handling
Max Speed
Acceleration

365 GTS/4 Daytona
Introduced: 1971

Handling
Max Speed
Acceleration

Dino 246 GTS
Introduced: 1972

Handling
Max Speed
Acceleration

512 BB
Introduced: 1976

Handling
Max Speed
Acceleration

Testarossa
Introduced: 1984

Handling
Max Speed
Acceleration

288 GTO
Introduced: 1984

Handling
Max Speed
Acceleration

328 GTS
Introduced: 1985

Handling
Max Speed
Acceleration

F40
Introduced: 1987

Handling
Max Speed
Acceleration

» [Master System] US Gold's *Out Run Europa* was the first and only seafaring *OutRun* game.

▶ but it would be 2003 before a true new *OutRun* arrived. Luckily, the wait was worthwhile.

***OutRun 2* was a first for the series – a direct, numbered sequel.** It's a pretty bold name, when you think about it. Essentially, players were being told that a true successor had finally arrived after 17 years of waiting. But there was reason to believe it was going to deliver on that promise, because it was being developed by AM2 with Yu Suzuki as the producer. Even within Sega, expectations were high. "I had not long joined Sega when *OutRun 2* was first discussed," Patrick recalls. "I have to say I was pretty excited, especially as my new job meant the opportunity to not only play it before anyone else, but more importantly, for free."

In many ways, it was the old made new again. *OutRun 2* used Sega's Xbox-based Chihiro arcade board, the most advanced hardware on the market at that time, and looked beautiful as a result. It offered a variety of cars to choose from, accommodating for different driving styles – and for the first time ever, they were licensed Ferrari models. But beyond that, the *OutRun* mode was the classic game reborn, a race against the clock across branching stages. "Everything you wanted was there but better," remembers Patrick. "The music, the visuals, the drift mechanic and suddenly multiplayer just clicked into place. Four-player races still had that sense of calm I cherished from the single-player." There was also a new Heart Attack mode, in which you had to impress your girlfriend by completing challenges, alongside Time Attack.

"At the ATEI show when it was exhibited publicly for the first time in Europe there was never a free seat to play from the moment the show opened until the power was shut off at night, the response was sensational," recalls Patrick. Arcade operators pounced on the game and an Xbox conversion quickly went into production at Sumo Digital, where developers were keen to get to work. "I was over the moon! Not only one of my favourite games of all time, but a proper AM2-developed sequel that hadn't even hit arcades over here," recalls Steve. However, it was far from a simple conversion job. "Taking an experience that could be completed in minutes as a coin-op to something that took a few hours on console was the biggest deal design-wise," says Sean. "Coming up with engaging challenges that felt appropriate to the brand and would enliven and grow an already almost-perfect experience was pretty tough." Steve recalls the technical challenge vividly, too. "Sega also wanted full online multiplayer! Plus, we had to pull it into half the memory than the arcade machine had, plus get it all to load and run from a DVD. Did I mention

» [Arcade] The System 32 hardware pushed beautiful scenery faster than ever before in *OutRunners*.

Did you know?

■ *Out Run 3-D* includes support for the Japan-only Master System FM sound unit, despite not being released there.

> **"Four-player races still had that sense of calm I cherished from the single-player"**
> Patrick Michael

F50
Introduced: 1995

Handling
Max Speed
Acceleration

F355 Spider
Introduced: 1995

Handling
Max Speed
Acceleration

550 Barchetta
Introduced: 2000

Handling
Max Speed
Acceleration

360 Spider
Introduced: 2001

Handling
Max Speed
Acceleration

Enzo Ferrari
Introduced: 2002

Handling
Max Speed
Acceleration

F430
Introduced: 2004

Handling
Max Speed
Acceleration

Superamerica
Introduced: 2005

Handling
Max Speed
Acceleration

Did you know?

■ The Mega Drive version of *OutRunners* includes the *Virtua Racing* car as a bonus, but only in Japan.

» Yu Suzuki was the creator of *Out Run*, as well as many other classic Sega games.

» [PC] The brightly-lit streets of *OutRun 2 SP*'s Casino Town are clearly inspired by Las Vegas.

» Sean Millard was senior designer on the Xbox port of *OutRun 2*

we had just over six months?" The tough job was pulled off well, though – with 101 missions, extra tracks based on the unconverted arcade games *Daytona USA 2* and *Scud Race*, and an unlockable conversion of the original game, the Xbox version was an excellent package.

While *OutRun 2* was good, it got even better in 2004 with the release of *OutRun 2 SP*. The game added rival cars to race against, as well as slipstreaming by driving behind other cars. But the biggest addition was a whole new set of 15 stages, based largely on locations in North America. "I think they nailed it so perfectly the first time, they wanted to look for improvements, but in a way that again sat with the whole mechanics of play rather than break the balance they'd achieved," says Steve. "All of the additions are natural and subtle ways for players to work on their techniques for better and better times. So picking when to overtake to get a boost from traffic, a brilliant risk/reward choice, the rivals were there to show you better lines and the new stages were sublime. The American road trip feel to *SP*, I think, gives the game a different feel, plus still plays to the history of *Turbo OutRun*, but in a complementary way."

OutRun 2 SP was made available in more cabinet configurations than the original version and was popular both as an upgrade and a standalone purchase, so it can still be found in many arcades. "The monster eight-player behemoth has yet to be surpassed by any driving game," highlights Patrick. "Walking up to one now you get a tingle of excitement. You look at those detailed rear mouldings and physically choose your ride. At release, the cost to the operator was extraordinary but they hold their value because the income is still there, the draw is still as strong."

Sumo Digital again developed the conversion of *OutRun 2 SP*, which was retitled *OutRun 2006: Coast 2 Coast* outside of Japan. The game built on the template of the original *OutRun 2*, with a variety of additional missions and unlockable content. Better yet, more players could get in on the act as PC, PS2 and PSP versions joined the Xbox version. A cut-down version called *OutRun Online Arcade* was released for Xbox 360 and PS3 in 2009, but this has since been removed from both services due to the expiration of Sega's licensing deal with Ferrari.

Since then, *OutRun* has been put into the Sega vault, appearing in cameos and retro re-releases, with its most recent release being on Nintendo Switch in 2019. There are no plans for *OutRun 3*, but Yu Suzuki gives us a hint as to how he would approach it. "I would want to use the newest technology to make the world's most pleasurable driving game experience. It would, of course, have to be a convertible, and you would be able to feel the wind and fog and changes in the weather," he tells us. "And there would be a pretty girl in the passenger seat," he adds.

Despite being dormant, there's still a huge amount of love for the *OutRun* series, and its enduring appeal easy to explain. "It is the epitome of 'just one more go' – the turns you take at the game are tantalisingly brief. It's like reading a book with short chapters, you can't put it down," enthuses Sean. "The structure works, the aesthetics work, the pace of the game is perfect – so many tiny things make it perfectly whole."

For Patrick, it's all about the atmosphere. "You have the magnetism of Ferrari, the warmth of the sun, the music and a wide, open road with the incredible drift mechanic," he smiles. :What more do you need?"

But we can't top Steve's succinct conclusion. "It's the freedom of driving expressed sincerely and perfectly," he opines – and there's no room for disagreement. ★

Special thanks to Steve Lycett for making this article possible.

FLASHBACK

THE 80s RETRO REVIVAL

HOW THE BEST DECADE FOR POP CULTURE MADE A MODERN-DAY COMEBACK

WORDS BY GRAEME MASON

» A certain magazine you might have heard of took advantage of the rampant nostalgia we were all feeling in the mid-Noughts.

In TV and cinema, the Eighties has been a rich seam of entertainment since the Noughts. Starting with remakes of Eighties TV shows such as Charlie's Angels, the trend gained traction during the decade, with high-profile cinematic reboots of *Starsky & Hutch*, *The Dukes Of Hazzard* and *Miami Vice*. It was as if someone in Hollywood had tripped a switch, and suddenly the Eighties were back. In reality, many of the movers and shakers in the industry had grown up in the decade and were experiencing nostalgia for the shows and movies they watched in their youth.

The trend had started even earlier in the music business, with the soundtracks to movies such as *The Wedding Singer* (1998) and *Grosse Pointe Blank* (1997) loaded with Eighties classics, as the synth, poppy sound of the decade made a comeback, thought by some observers to be a reaction to the Grunge and indie-led movements of the early-to-mid Nineties. What's more, Eighties culture was beginning to infuse into society, with fashion and toy trends mimicking those of 20 years earlier. It wasn't just in cinema and television: the Eighties were undoubtedly hip, more so than the first time around.

But with the more tech-led videogames industry, things were a little different. Away from a hardcore fanbase discussing Eighties games in specialist internet forums, there was little mainstream interest in the games of the previous decade. PlayStation and 3D graphics card-enhanced PC games seemed a world away from the pixelated games of the Eighties – surely we would never see the likes of those again as a commercial venture?

Then, in 2004, there arrived a focal point. The multiformat magazine *Games™* had already been running a popular retro section since its first issue in December 2002; now, a rival publisher, Live Publishing, was taking the dip and promising a minimum of four issues of a new mag dedicated to old games. **Retro Gamer** was an instant smash, the first few issues focusing heavily on Eighties 8-bit computers such as the ZX Spectrum and Commodore 64. The buzz continued throughout 2004, with events, such as the

» [PS2] *GTA: Vice City* took us back to a *Miami Vice* and *Scarface*-inspired Eighties open world to great effect.

» [PC] *Shovel Knight* looks like a forgotten NES title, but under the hood, it's a supercharged 2D platforming masterpiece.

» [PC] *Pacific Drive*, released in 2024, channels retrowave weirdness with survival gameplay and an Eighties station wagon.

» Eighties classics saw re-releases as early as the PS2, Xbox and GameCube era of gaming.

first Classic Gaming Expo UK providing a hub for nostalgic gamers to meet and discuss their favourite games. Sixth-generation consoles like the PlayStation 2 got in on the act with retro compilations, the best of which, *Midway Arcade Treasures* and *Taito Legends*, were stuffed with Eighties arcade classics such as *Defender*, *Gauntlet* and *Bubble Bobble*.

Suddenly, forums sprouted everywhere, encompassing obscure systems, demo scenes and collectors. Then, as Facebook quickly grew in popularity, more groups and virtual meeting places arose, with gamers eagerly wallowing in the warm nostalgic glow of the games they played while growing up or as young adults. The Eighties retro gaming phenomenon grew into the Tens, with compilations of classic games continuing and revivals of famous series as diverse as *R-Type* and *Castlevania*. Moreover, games with the Eighties 'feel' or aesthetic began to surface, buoyed by the emergence of indie platforms such as Xbox Live and Steam.

The Indie effect has been a significant driver in the emergence of Eighties-inspired retro gaming with pixelated 2D platformers, in particular, gaining in popularity throughout the Tens and into the current decade. Thanks to games such as *Terraria*, *Stardew Valley*, *Dead Cells* and *Shovel Knight*, these indie efforts have gloried in their pixels, each imbuing the look with modern-day mechanics and gameplay, drawing in gamers who were seeking out the spirit of 25-odd years earlier.

Away from this influence and the evident nostalgic memories of happier, more carefree times, the simplicity of Eighties games has played a part, as has the general cultural renaissance. From frantic arcade shooting games to devilishly tight platformers and the stratification of the graphic text adventure to point-and-click, the Eighties helped forge many genres, usurped by new types of game, before being mined again from 2010 onwards via modern and retro formats, the latter thanks to homebrew scenes.

Without a doubt, the accessibility, whether it be retro compilations, miniaturised plug-and-play devices – most notably the NES Mini – or services and online stores like Games Pass, Antstream Arcade and PlayStation Plus, is better than ever, putting gamers directly in touch with the happy memories of their younger days, whether it be remakes, remasters, reimaginings, or that actual game they used to play as a kid. ✱

» [PC] *Hotline Miami* is a dark, ultraviolent top-down shooter that is set to a pulsing Eighties-inspired soundtrack.

EIGHTIES NEVER SAY DIE!

THE RETRO SERIES THAT KEEP MAKING A COMEBACK

DIZZY

▶ The *Dizzy* franchise grew throughout the Eighties and early Nineties and has a dedicated fanbase today. The latest game, *Wonderful Dizzy*, supposedly the last, was released in 2020.

THE BARD'S TALE

▶ The Eighties spawned three games in this popular RPG series before Brian Fargo's InExile Entertainment acquired the name for the spiritual 2004 reboot. 2018's *The Bard's Tale IV: Barrows Deep* continues the original story.

R-TYPE

▶ Since the rock-hard shooter first debuted in 1987, it has produced several sequels and a re-imagining in *R-Type Final* on the PlayStation 2 in 2004, followed by the incongruously titled *R-Type Final 2* in 2021.

STREET FIGHTER

▶ Also first appearing in arcades in 1987 was one of the most famous one-on-one beat-'em ups of all time. *Street Fighter* anime, movies, and more have since appeared, while in 2023, the sixth game in the main series was released.

PRINCE OF PERSIA

▶ Jordan Mechner's beautifully smooth *Prince Of Persia* just slipped in at the tail end of the Eighties and has inspired multiple games and other media since. The roguelike *The Rogue Prince Of Persia* debuted in May 2024.

HEAD OVER HEELS

▶ The release of the new Spectrum computer, the Spectrum Next, has inspired several updated classics. Revered by a considerable cadre of 8-bit fans, Jon Ritman's 1987 isometric classic is back thanks to the development team of Michael 'Flash' Ware and Simon Butler.

© Getty

THE EVOLUTION OF THE LAST NINJA

The Last Ninja was influenced by Ultimate's adventures, Bruce Lee and International Karate, and it subsequently inspired a series of hit follow-ups. System 3 founder Mark Cale explains how his combat-based arcade adventure evolved

WORDS BY RORY MILNE

Many of the great UK games developers of the Eighties were synonymous with just one home computer. Ultimate favoured the ZX Spectrum, and while System 3's Mark Cale respected the firm's arcade-style adventures, he remembers thinking that he could better them with a Commodore 64 title that combined puzzle-solving and martial arts. "Some of the most successful games where you went around solving puzzles – in particular those from Ultimate – weren't quite graphical enough," Mark considers, "so what I really wanted was to have beautiful graphics combined with adventure elements. Guns had been done to death, and we had been very successful with *International Karate*, so we wanted to have combat with a variety of weapons, and put that into a feudal Japan environment."

Having chosen an ancient Far East setting for his adventure, Mark named it *The Last Ninja* – after making its ninja hero the last of a clan.

MARK CALE

» It's surely only a matter of time before System 3 founder Mark Cale revives *The Last Ninja* franchise.

He then devised level designs with the same structure as the movies of a martial arts master. "Bruce Lee films like *The Big Boss* were like Japanese games," Mark points out, "where you went through a level and had a boss at the end. So that was why I chose to do what I did when I designed *The Last Ninja*. Datasoft's *Bruce Lee* game was an all-time favourite of mine, but we didn't want a side-on platform game, because I just thought puzzle games worked so well in an isometric view."

The puzzles Mark designed for *The Last Ninja* were based on finding items to overcome obstacles, but he felt the objects would get lost in the game's intricate and ornate backgrounds. "I thought if we had hid the items people would have never found them," Mark reasons, "so we had to design something that made it a little bit easier for the player to find them and work out what they were. There was a big battle with that, because my programmer, John Twiddy, didn't want them flashing, but I said that people would give up looking otherwise."

» [C64] The various weapons in *The Last Ninja* include shuriken, nunchucks and bamboo staffs.

Further pointers to solving *The Last Ninja*'s puzzles followed, in the form of water fountains and Buddha statues that told players which object to look for next. "I liked the idea of giving respect to the Buddha statue, which would then reveal things to you," Mark enthuses. "As you went up to it you would kneel, and it would reward you. That was influenced by the fact that in a lot of Japanese temples you prayed and rang a bell and put money in as a courtesy."

The design for *The Last Ninja* wasn't entirely realistic, however, in so much as it incorporated monsters, animated skeletons and ghosts. "The game wasn't *accurately* based on Japan," Mark notes. "We *did* take on the idea of ninjutsu, but we also put fantasy in there by creating mythical creatures. I just felt that we didn't want to just have different guys fighting; we wanted to put in some creatures to make the adventure a little bit more appealing and a little more mystical."

As well as giving variety, some of *The Last Ninja*'s mythical monsters also acted as bosses, which Mark dotted throughout his design. "We looked to China and the wider Far East for the dragons and sea serpents, because they suited the content of the game," Mark recollects. "The dragon that you had to get the sleeping potion to defeat was also about having bosses at certain stages of the levels. So it was going back to *The Big Boss* again – you had to have a major character or event that would try to stop you."

> "We wanted to have combat with a variety of weapons, and put that into a feudal Japan environment"
>
> MARK CALE ON THE LAST NINJA

But compared to its bosses, other aspects of Mark's project proved impossible to implement, and so its stepping stone challenges were made tests of precision. "The rivers and swamps were always part of the game," Mark acknowledges, "but they weren't designed to be *that* challenging. I wanted players to jump on certain rocks, and if they didn't move on quickly enough, they would sink down or a water dragon would get them. But the way that the artists set things out that wasn't ▶

» [C64] Praying to Buddha statues in *The Last Ninja* reveals which items to look for.

» [C64] There are a host of otherworldly opponents in *The Last Ninja*, including animated skeletons.

STAGES OF EVOLUTION: OBJECT LESSON

FROM APPLES AND CACTI TO FINDING EVIDENCE AND FORGING KEYS

THE LAST NINJA

When you're playing *The Last Ninja* it's worth remembering the old adage that an apple a day keeps the doctor away, as the apples in the game restore lost lives. You also have to find certain items to solve puzzles, and there are challenges that require specific tools and equipment.

TUSKER

Tusker's puzzles are based around finding and using objects in less than obvious ways, so as well as trial and error, you need some general knowledge. For example, to get water in the desert you have to cut open a cactus with a knife and fill a bottle with the water that spills out.

VENDETTA

You need to find items in *Vendetta* to overcome challenges – like wire cutters to defuse a bomb. But you also have to collect evidence of the kidnapping you're trying to foil. As well as video of the crime, you have to find personal belongings that have been left behind by the victim.

LAST NINJA 3

The way to approach *Last Ninja 3*'s puzzles is to be creative. A climb up a sheer cliff requires a firm grip, but gloves alone aren't enough, so you add steel talons. Or you need a key, so you find a mould and a metal ingot, and then look for a fireplace that you can forge a key in.

STAGES OF EVOLUTION:
MORTAL COMBAT

HOW FISTS AND NUNCHUCKS LED TO SLINGSHOTS AND UZIS

THE LAST NINJA

You begin your mission with no weapons, but with practice you should be able to stealthily run past opponents rather than potentially taking damage in unarmed combat. A sword and nunchucks can be found early on in the game, and these are probably the game's most effective weapons.

TUSKER

Whether or not *Tusker* was influenced by *Indiana Jones*, there's a definite feel of the movie when you're playing the game – although the hero doesn't use a bullwhip. The weapons that *are* in the game include a knife, a gun (which you need to find ammo for), a machete and a slingshot.

VENDETTA

The weapons in *Vendetta* are more of a necessity than an option. The game's enemies are armed to the teeth, and while its hero is a skilled hand-to-hand fighter he's not bulletproof. Luckily, there are Kalashnikovs and Uzis to be found, although ammo is scarce so every shot counts.

» [C64] Instead of mythical creatures like the original, *Last Ninja 2* has modern-day equivalents like alligators.

» [C64] Unlike its predecessor, *Last Ninja 2* has stationary enemies with long-range attacks.

» [C64] It pays to explore in *Last Ninja 2*, there are even nunchucks hidden in a toilet!

possible, and I had huge rows with John Twiddy because I thought it was ridiculous to have things pixel-perfect."

In spite of its daunting physical challenges, *The Last Ninja* was lauded by reviewers when it came out and soon topped the sales charts. Mark moved the inevitable sequel to the present day, and from Japan to the US. "New York was an iconic city with very distinctive features," Mark reflects, "so there was a lot you could do with that in a game. And if you looked at *Highlander*, he started in Scotland in the past, and then he was in America in the present day – because people identified with modern-day America. It was the same principle with *Last Ninja 2*."

Other changes that the follow-up made to *The Last Ninja* formula included a greater emphasis on exploration, where items were hidden in bins and other unlikely places. "Well, the nunchucks in the toilet was an obvious puzzle, because you used to flush an English toilet by pulling a long chain with a wooden handle!" Mark laughs. "So that one was obvious! I think people had also become used to *The Last Ninja*, so we wanted to slightly change things for the sequel. It was really just the next phase in developing the series."

Another aspect of the sequel differed from its predecessor simply because of its modern-day setting, in so much as Mark's design traded mythology for technology. "We were a bit limited with the mythical side for *Last Ninja 2*," Mark concedes, "so there were more grounded characters like the alligator in the sewer. It was a little bit different from *The Last Ninja* and the freedom we had there, but then we could use things that we couldn't have in the first game, like the helicopter. So we used that as a big element that helped you progress, and other things that were in the present day."

Additional improvements over the original came in the form of seemingly harmless bystanders concealing ranged weapons, like juggling street performers and first-floor apartment dwellers. "Someone throwing something out of a window at you was just something different than having guys to fight on every screen," Mark explains. "It was also something that you had to be aware of and that you had to learn as you were playing your way through the game. I think that came from the archer and the blood at the end of *The Last Ninja*. That was where we started doing that sort of thing, and it was a progression from there."

A progression of an entirely different kind was seen as essential, and so *Last Ninja 2*

» [C64] New York was picked as *Last Ninja 2*'s setting because of its globally recognisable features.

» [C64] Essentially an enhanced *Last Ninja 2*, *Last Ninja Remix* has nicer surrounds and a cinematic intro.

> "New York was an iconic city with very distinctive features, so there was a lot you could do with that in the game"
>
> MARK CALE ON LAST NINJA 2

left the stepping stones of the original behind in favour of boats floating down streams. "The feedback from a lot of the reviews – and everyone else – was that the challenges in *The Last Ninja* were a really shit idea, 'Why had we made it pixel-perfect to get over a fucking rock?'," Mark paraphrases. "So we based the challenges in *Last Ninja 2* around a boat, and made that easier to jump on – but it was moving! So that was the challenge, it was a moving object. And it was fairer, because it was a timing challenge."

Last Ninja 2's less demanding challenges, modern-day locations and fresh mechanics were duly noted by excited reviewers on its release, and the follow-up went on to outsell its predecessor. But instead of a third ninja game, Mark's next design – *Tusker* – featured an intrepid explorer. "I had this whole suite of ideas in my mind for what type of games to do; I wanted *different* games and *different* gameplay styles," Mark recalls. "I think the concept of the elephants' graveyard in *Tusker* was great, but I felt the game's puzzles weren't obvious enough. I just didn't like the fact that everything was so subtle." Like *The Last Ninja*'s stepping stones, but on a grander scale, *Tusker*'s puzzles were designed to be intuitive but became overly challenging during the game's prolonged development. "The programmers thought that people would finish the game too quickly, so they made it difficult just for the sake of it," Mark sighs. "To me, that didn't make a game play. Otherwise, *Tusker* could have been a lot bigger than it was. I think there was also an element where a lot of my team just wanted to keep doing ninja games."

Despite Mark's reservations, *Tusker* reviewed well, and so rather than revisit *The Last Ninja* with his next arcade adventure he devised an action hero title called *Vendetta*, where items were used as evidence as well as to solve puzzles. "It was to try to fit everything together," Mark says of *Vendetta*'s innovative use of objects. "We wanted *Vendetta* to be more of a secret agent thing, so that's why we went in that direction. The other nice thing about the game – which I think we could have made more of – was picking up guns, because we had moved away from swords. A lot of the cinematic parts were because I had artists like Tony Hagar and Dokk working with me at that time, and they did some fantastic work."

But as novel as *Vendetta*'s shoot-'em-up elements, evidence collection and cinematic intro were, it differentiated itself from the *Last Ninja* games most with its combat driving stages. "Although *Vendetta* took elements from *The Last Ninja* and its isometric view, we also put in the idea of driving from each location to the next to take it a stage further," Mark reviews. "We wanted to have two game types in one. So you had an isometric adventure, and obviously you had the skill element of getting to the next level. That just made it a bit different to what other people were doing." ▶

» [C64] The puzzles in *Vendetta* are more obvious than *Tusker*'s, but they're still quite sophisticated.

» [C64] Like *The Last Ninja*, *Tusker* has its share of monstrous myth-based bosses that guard a level's end.

» [C64] Fighting armed foes with your fists in *Last Ninja 3* builds up Bushido, which helps in boss fights.

» [C64] *Last Ninja 3*'s statues are just as useful as the ones in the original game.

"You had to power up your abilities, and once you had your Bushido indicator at full power it made it easier to take on the boss"

MARK CALE ON THE LAST NINJA

» [C64] The floating lily pad in *Last Ninja 3* °behaves similarly to the boats in *Last Ninja 2*.

Vendetta's sky-high ratings when it was reviewed proved that its point of difference had paid off, and Mark later continued this approach when re-releasing *Last Ninja 2*. "A lot of companies would re-release games, and we wanted to re-release some of ours, but also *remix* them with unique graphics and a nice intro," Mark says. "*Last Ninja Remix* was also to coincide with the C64 GS console coming out, so we could put a *Last Ninja* game straight on there, but remix it so it was a little different for someone who had bought a C64 GS and already had *Last Ninja 2* for the C64."

The almost-perfect review scores for *Last Ninja Remix* helped make the case for a third *Last Ninja* title, although this was already well underway. Mark hoped a dynamic approach to bosses would help *Last Ninja 3* meet its audience's expectations. "*Last Ninja 3* was right at the end of the 8-bit era, and people were asking for more and more sophistication," Mark remembers. "We also wanted to keep the theme of bosses. So you were trying to take on a shogun that had ultimate mystical power in the *sixth* dimension, there were *six* levels, and the *six* bosses were different incarnations of the shogun. It wasn't obvious enough, but that gave you 666."

Backstory aside, the mechanics of *Last Ninja 3*'s boss fights were a step up from its predecessors, in that the 'Bushido' that helped you beat bosses was gained by fighting many minions using superior weapons or fewer minions using inferior weapons. "Bushido is all about honour and fighting," Mark observes, "and it was all there in what we were trying to do. But again, I think it was lost on a lot of people. We wanted to make the combat more than just 'tap, tap, tap'. So you had to power up your abilities by achieving certain tasks, and

» [C64] The final confrontation with the shogun in *Last Ninja 3* requires power and Bushido.

then once you had your Bushido indicator at full power, it made it easier to take on the boss at the end of the level."

Another major innovation related to *Last Ninja 3*'s puzzles, where rather than lock and key challenges like the previous games, players had to bring multiple items together. "The puzzles weren't straightforward enough all of the time," Mark feels, "and that made the game a little bit more frustrating for people. Yeah, OK, it seemed obvious to get a combination of things together to make something that you could use. But I think that when things became too challenging you turned off the mass market, and at times, *Last Ninja 3* was a little bit too challenging for some people."

By comparison, the floating wooden boards on the *Last Ninja 3*'s lava lake posed far less of a challenge, but only once you realised not to use them to cross the lava. "The wooden boards were a homage to *The Last Ninja*'s stepping stones – but they were a piss take!" Mark grins. "You could just jump over the narrow bit of the lava, but the idea was that most people wouldn't. They'd think they had to jump onto the boards, and wouldn't try jumping over the narrow bit. So it was there to carry that whole idea through the series, and because I was so fucked off with John about those stepping stones!" When asked about a fourth *Last Ninja* title, Mark seems enthusiastic about the idea, and offers a compelling argument for keeping the series in isometric. "We've had a number of attempts to do it," Mark admits. "We even tried third-person on the PS2, but I wasn't satisfied with it, so I canned it in the end. But we could certainly do it justice now. I think you would have to do a whole world in isometric, where you could zoom in and change your view."

On reviewing the line of arcade-style adventures that began with *The Last Ninja,* Mark sounds like a proud father, and he concludes by drawing attention to the staggering number of C64 gamers who owned at least one *Last Ninja* title. "I'm immensely proud to have produced and created *The Last Ninja*, and we have a lot of fond memories of the *Last Ninja* games," Mark beams. "In terms of sales, they were far bigger than *Tusker* or *Vendetta*. *The Last Ninja* and *Last Ninja 2* were distributed by Activision, and the sales of *Last Ninja 1*, *2* and *3* on the C64 were over 23 million copies. That's quite incredible, because Commodore only sold just over 20 million machines in total." ★

STAGES OF EVOLUTION: LEAPS OF FAITH

STEPPING STONES, FLOATING BOATS, GAPING CHASMS AND LAVA LAKES

THE LAST NINJA

There's a learning curve to *The Last Ninja*, in that you have to learn to fight and pick items up, but the game's physical challenges are much more challenging. The issue is that its rivers and swamps are crossed using stepping stones, and each perilous step requires pixel-perfect precision.

LAST NINJA 2

The unenthusiastic response to *The Last Ninja*'s stepping stones was duly noted, and so in *Last Ninja 2* you jump into and out of fast moving boats instead. This is far less frustrating than leaping from stone to stone, simply because it's a test of timing rather than precise positioning.

TUSKER

There's no jumping in *Tusker*. Maybe its developers were scarred by *The Last Ninja*'s stepping stones! However, there's a gaping chasm in the game's finale, and no way to leap over it. The solution, of course, is to walk over a plank of wood. If only that was an option in its predecessor!

LAST NINJA 3

It's fair to assume that *Last Ninja 3*'s wooden board stepping stones over lava are a callback to the original, and in a way they are. The twist being that they can be ignored in favour of leaping over the lava where it is at its narrowest, which is funny if you haven't spent ages using the boards.

Double Dragon

» **DEVELOPER:** Technos » **YEAR:** 1987 » **COST TODAY:** £1,000+

It's safe to say that *Double Dragon* didn't invent the 'wandering down the street punching thugs' genre – *Kung Fu Master* and *Renegade* were flying the beat-'em-up flag beforehand. However, there was something a bit special about *Double Dragon* – from the moment you saw the Black Warriors gang attack and kidnap Marian, you were more invested in rescuing her. Of course, co-operative gameplay set *Double Dragon* apart from rival games in the genre too, and it set up a memorable final confrontation in which Billy and Jimmy Lee faced off for the affections of the damsel in distress. The game's success inspired a wave of imitators including the likes of *Final Fight*, as well as a multitude of home conversions and arcade sequels, kicking off a golden age of beat-'em-ups that has yet to be matched.

Double Dragon was distributed by Taito, and came housed in custom variants of the company's GTC-100 universal cabinets, featuring *Double Dragon* bezel and control panel art as well as a marquee. As these cabinets were built to be easy to convert into new games, it's quite common to see other late-Eighties games with the old control panel and the distinctive twin dragons framing the screen. ✱

Double Dragon fact

■ The custom board for *Double Dragon* is very complex. Rather than using an expensive 16-bit CPU, *Double Dragon*'s main program runs from two 8-bit CPUs, with a third CPU dedicated to driving sound.

STANDOUT MOMENT **Abobo's Big Entrance**

Of all the enemies in *Double Dragon*, the big bad Abobo is the one that draws the most attention to himself. He's a bit of a terror whenever you see him, and you can instantly tell that he's more dangerous than the average grunt just from the sheer size of him. But to really hammer the point home, Technos decided to give him a memorable debut. As you battle your way through the first stage, you find yourself fighting some regular thugs outside a building when this monster among men *bursts through the wall*, absolutely terrifying you in the best way possible.

Inside the MEGA

When Sega set out to replicate its arcade hardware in an affordable form, it ignited a console war and captivated a generation. Retro Gamer speaks to key developers to learn about the technological factors that made this 16-bit console a classic...

Words by Nick Thorpe

If there's one thing that characterises Sega during its years as a console manufacturer, it's a relentless pace of technological development. By the middle of 1986, the company had put together the SG-1000 Mark II and the vastly upgraded Mark III. The design of the Master System, the export version of the Mark III, was finished and manufacturing had started. Having released four pieces of hardware since 1983, it might have seemed like Sega should take a break. However, none of the company's releases had helped it to claw market share away from the dominant manufacturer, Nintendo.

To try to make an advance in the market, Sega began work on a 'Mark V' console designed to achieve a true generational leap. In the book *Sega Mega Drive/Genesis: Collected Works*, Masami Ishikawa explains that the primary goals in producing the Mega Drive were to retain compatibility with the Master System, and to provide the basic performance of its relatively new System 16 board. This board was already powering hit games like *Fantasy Zone*, and would remain an active part of Sega's development plans for the remainder of the Eighties, hosting games such as *Shinobi*, *Alien Syndrome*, *Altered Beast* and *Golden Axe*. This project would ultimately become known as the Mega Drive (or Genesis, in North America). ▶

DRIVE

DISCLAIMER!

■ This feature was originally published in June 2018. Sadly, Rieko Kodama passed away on 9 May 2022. Her work will continue to be admired by those in the gaming community and our thoughts are with her loved ones.

Sega Superstars

The developers who made the Mega Drive shine

Rieko Kodama
Artist and director, Sega (during the Mega Drive years)

Trip Hawkins
Founder of Electronic Arts

Mark Cerny
Founder of Sega Technical Institute and programmer

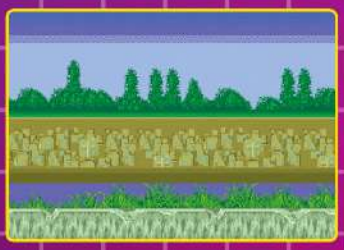
Matt Phillips
Director of Big Evil Corporation

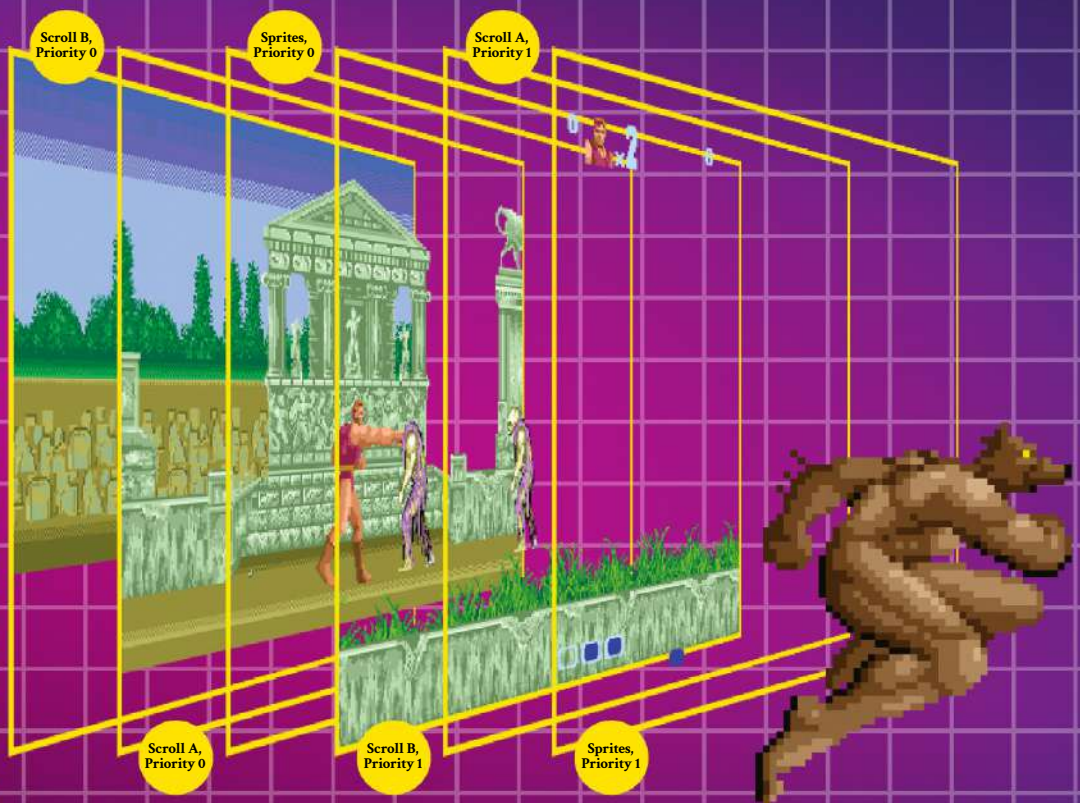
Takashi Iizuka
Game designer (Golden Axe 3, Sonic 3, Sonic & Knuckles)

You've been framed

The Mega Drive's multilayer display was a new feature for consoles – here's the complex process that goes into creating a frame...

01 The Mega Drive VDP draws three graphical layers, named Scroll B, Scroll A and Sprites. The Scroll layers are background tilemaps that can be scrolled in any direction and have limited animation, while the sprite layer is for the in-game objects that need to move around quickly and animate fully. These layers are then passed to the priority controller.





02 The priority controller ensures that items are drawn in the correct order. It starts with a fixed order of Scroll B at the back, Scroll A next and Sprites on top. However, if part of any layer has a priority bit set to 1 instead of 0, it is cut out and placed in front of everything with a lower priority, in the same B/A/Sprites order. Here's how it works:

SCROLL B, PRIORITY 0

■ This is the furthest part of the background, and the slowest moving. Note that the lower part of this layer isn't used because it wouldn't be visible.

SCROLL A, PRIORITY 0

■ The nearer portion of the background is here, and is moved faster than Scroll B in order to create a parallax scrolling effect.

SPRITES, PRIORITY 0

■ This is where the main action happens – your character and the enemies all appear here. This layer has its own priority system, too.

SCROLL B, PRIORITY 1

■ The free space on the lower part of Scroll B has been used to create a foreground, with the priority bit pulling it in front of even the sprites.

SCROLL A, PRIORITY 1

■ Areas not needed to draw the main background have been used for the HUD – although not all of it, curiously.

SPRITES, PRIORITY 1

■ The remainder of the HUD goes here, drawing over the top of everything else.

03 The frame is fully assembled, ready for display. If you're using a 32X, there's an extra layer added before the picture goes to the TV – and the regular Mega Drive graphics can be either overlaid or underlaid, depending on the needs of the game in question.

MEGA FACT

■ The largest official Mega Drive cartridge is *Super Street Fighter II: The New Challengers*, at a whopping 40Mbit (5MB) – over the theoretical 32Mbit maximum.

» [Mega Drive] Clever use of the Mega Drive's scrolling layers allowed for this giant airship to appear.

» [Mega Drive] Mastery of the Mega Drive's custom VDP led to cool graphical effects like these light shafts.

"I did not care for the NES because of its 8-bit limitations and the draconian licence agreement"

Trip Hawkins

The most significant decision Sega took during the development of the Mega Drive was its choice of CPU. Again in *Collected Works*, Masami Ishikawa notes that this was the most important component choice issue – the hope was to use the popular Motorola 68000 CPU, the 16-bit CPU from which the System 16 gained its name. Introduced as a high-end part in the late Seventies, the processor was in mass use by the late Eighties. The big attractions such as *Hang-On* were using two 68000s per board, but the more economical System 16 board introduced in 1986 used just one.

However, the cost of the chip forced the hardware designers to consider an 8-bit alternative. Even the Atari ST, marketed as offering "power without the price" was over £200 at the time. The Mega Drive's retail price of 21,000 yen was less than half of that, roughly £95 in late 1988. In the Japanese book *Sega Consumer History*, hardware designer Hideki Sato explained that the issue ultimately came down to negotiations with Signetics, which manufactured 68000 CPUs. Sega had asked for a very low price, and eventually secured it for a blanket order of 300,000 chips.

For programmers and engineers, securing this CPU was crucial. Mark Cerny, who had spent much of the late Eighties in Japan programming games for the Master System was also enthusiastic. "It was wonderful to be able to use a 68000 CPU. I'd had some experience with them back when I was making arcade games – for example, *Marble Madness* was based on another member of the 68000 family – and had really been missing the straightforward programming model and high performance."

For Trip Hawkins, founder of Electronic Arts, it was even more important. The company was a leading publisher of computer games, but as prices remained high and manufacturers failed to embrace the consumer market, it became clear that consoles were going to take over the market. The problem was the console market leader. "I did not care for the NES because of its 8-bit limitations and the draconian licence agreement and I also suspected, correctly as it turned out, that Nintendo would milk it for too long and leave the 16-bit door wide open," Trip recalls.

» [Mega Drive] Takashi Iizuka counts *Comix Zone* as one of his favourite Mega Drive games, but has never played the final game.

At the time, we felt that Nintendo had really opened a window of opportunities for other platforms by not shipping the Super NES in the US until 1991," Mark agrees. "Console sales peak around Christmas and New Year, and we had two full holiday seasons to show the US audience what the Mega Drive could do before the Super NES ever showed up!" From Mark's perspective within Sega, it makes sense that the Mega Drive would be the best choice to take advantage of the 16-bit open goal. But from the outside, electronics giant NEC and its PC Engine/Turbografx console could have seemed like the safer bet. Trip didn't believe so, though. "I never considered NEC a consumer company and never considered the Turbografx a real 16-bit system," he explains. "From a marketing and software standpoint I knew that NEC had no chance against either Nintendo or Sega."

Ultimately, EA's backing was won on technical grounds. "Sega's design that included the MC-68000 along with separate graphics and sound chips, two joysticks and a price under $200, was exactly what the market needed," asserts Trip. "Way back in 1978, I led Apple's pivot to the office desktop market and was tasked to work with Steve Jobs on the hardware spec for a 16-bit system. We both loved the Motorola MC-68000 and it went into the Lisa and Mac. When I founded EA, we bought Sun workstations for our best developers and they also had the 68000," he explains. The CPU perfectly fit the company's focus on home computers, too. "We had extensive experience and an enormous code base for the 68000 and had a great deal of content that also knew how to take advantage of a GPU and sound chip."

Matt Phillips is a developer with credits including *Homefront: The Revolution* and *Lego City: Undercover*, whose love for his first console has led him to develop the original Mega Drive game *Tanglewood*. "It's relatively very simple compared to the likes of Xbox One and PS4, which is both a curse and a blessing. Coding needs to be done to-the-metal, the machine has no operating system, no device drivers, and if you'd like to squeeze any kind of performance out of its tiny 7MHz CPU then everything needs to be done in raw

"I was very excited to work on a system which had new features"

Rieko Kodama

▶ assembly language." When asked about the console's strengths, he concurs with those who were there at the time: "The 68000 processor, without a doubt. It was an excellent choice for a games machine of the time, and I still keep finding things about it that impress me even today."

The 68000 CPU was a huge part of what made the Mega Drive work. Its adoption allowed everyone from Japanese arcade coders to European developers to transition to the machine smoothly. What's more, it was a powerhouse for its time – after all, this was a proper arcade CPU in a home console. Though the CPU's fast clock speed has been spun as a major advantage over the SNES and its Ricoh 5A22 CPU, the truth is that the two machines process a similar number of instructions per second – but that in itself is impressive, given that the SNES arrived two whole years later. However, the 68000 did possess real speed advantages in the form of a wider data bus, faster memory bandwidth and faster arithmetic performance.

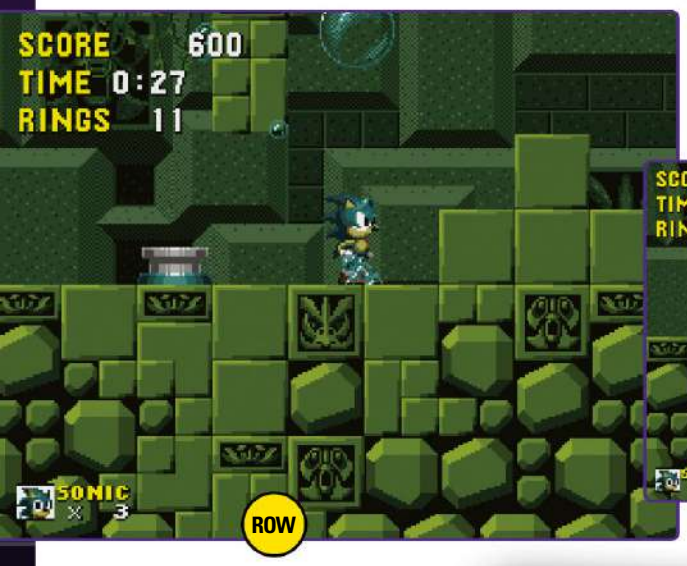
While the CPU benefited from familiarity, Sega created a custom visual display processor (VDP) for graphics, an evolution of the Master System's VDP. "I was very excited to work on a system which had new features. I remember when I saw the Mega Drive board for the first time, this was before it was made more compact, it was bigger than the table," remembers Rieko Kodama, a veteran artist whose graphics appear in Mega Drive games such as *Altered Beast*, *Sonic The Hedgehog* and *Phantasy Star IV*. "The most exciting feature for me was the enhanced colour variation. I'd imagined that it would be much easier to draw three-dimensional objects now, which was difficult on the Mark III/Master System." That may sound odd to readers who know that the Mega Drive's colour capabilities are relatively weak, but as Kodama points out, it was still an upgrade: "It was limited, but I can't complain compared to the number of colours with the Mark III and Master System."

» [Mega Drive] Matt Phillips created a brand-new Mega Drive game, *Tanglewood*, using old-school techniques and hardware.

The Mega Drive didn't just show more colours than the Master System. Its display resolution was 45% higher, it could display up to 80 sprites, and it had four times the graphic RAM, allowing for more unique tiles to be held in data. The Mega Drive could also display two background layers alongside sprites, and was capable of manipulating them with a priority system and line scrolling for further complexity. "It became possible to show depth," says Kodama. "With two-layer scrolling and rastering and so on, we were able to create roads with depth in driving games, or show floating under water. Talking about my work, the Labyrinth Zone in *Sonic The Hedgehog* used these features. I think we were able to add a little more weight to Sonic's movements. I hope you've enjoyed the underwater action and the atmosphere of the labyrinth."

For Matt, the Mega Drive's graphical capabilities have been a constant thorn in the side. "The small video memory has been the project's Achilles' heel. What makes it worse is that the machine was originally designed to support twice the amount – the graphics chip supports 128KB of VRAM," he says. "I believe it was cut for cost reasons, and I think that was a big mistake." This was a decision made late in the hardware design process – the larger capacity had been experimented with, but the benefits were felt to be merely incremental gains. It's also worth noting that by mid-1988, a RAM shortage caused prices to quadruple since the beginning of the year."Another issue is its very limited palette size," Matt continues. "It can only display 61 colours at a time (excluding a shadow mode and some hardcore tricks). Thankfully I've been working with artists who have managed to squeeze the very best out of so little, but it's not been easy."

The actual process of creating art for the Mega Drive varied from company to company. At Sega's internal studios, the increased artistic demands changed the development process. "Compared to the Mark III/Master System days, we certainly increased development time and design staff. As ROM capacity increased, so did the work for the designers," recalls Kodama. "However, we now had less pressure with the number of colours and how to draw the objects, since we had more leeway from an artistic point of view due to the evolution of the new system." Artists at Sega used a custom workstation known as the Sega Digitizer System. This hardware, which had evolved through the SG-1000 and Master System generations, consisted of a graphic tablet and a puck, a light pen for working with the screen, and two CRT monitors.



» [Mega Drive] American and European copies of Sonic didn't include the line scroll effect Rieko Kodama mentions…

» [Mega Drive] …the Japanese game uses it to create wavy distortions that convey the feeling of being underwater.

MEGA FACT

■ In South Korea the Mega Drive was officially marketed by Samsung, under the names Super Gam*Boy and later Super Aladdin Boy.

» [Mega Drive] Electronic Arts was a prolific Mega Drive publisher, and built much of its sports empire on the console.

Third-party studios used a variety of solutions, with Deluxe Paint on the Amiga proving particularly common amongst Western devs.

On the audio front, Sega opted for the YM2612 FM synthesis chip from Yamaha, noting in its development manual that it resembled the YM2151 chip used in its arcade games. An 8-bit Z80 CPU was included to drive this chip, which had the dual effect of replicating the System 16 set-up and enabling Master System compatibility. The chip provided six channels of FM sound, a low frequency oscillator to distort those sounds, and the capability to replace one of those channels with a channel for 8-bit digitised audio – often used for speech effects or sampled instruments. That was two fewer channels than the YM2151, and was no big deal compared to what was available in the computer market as any fan of the Amiga's Paula sound chip will tell you. However, this was still a huge advance for console sound. Bear in mind that Sega had ▶

Graphic scenes

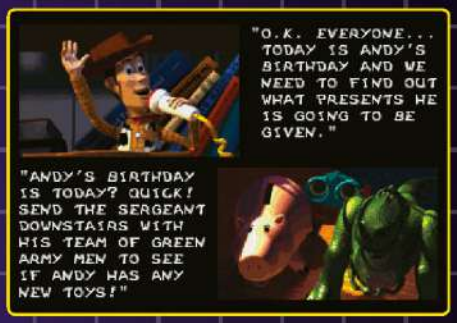
Getting the best visuals from the system required artistry, programming and smart hardware use

DITHERING

■ Thanks to the blurry RF and composite connections frequently used during the late Eighties and Early Nineties, nearby pixels would blend together on a TV set to create new colours and transparency effects. Artists used this technique on many consoles, but the Mega Drive's relatively limited colour palette meant it was employed especially frequently.

LINE SCROLL

■ The Mega Drive's graphics hardware can scroll individual parts of a single layer at different speeds. This can be used to create all kinds of unique effects – racing games use it for curves in the road, *Street Fighter II* uses it to add perspective to the ground, *Sonic 2* simulates additional background layers and *Rocket Knight Adventures* uses it for heat distortion.



SHADOW/HIGHLIGHT

■ This hardware feature enabled the brightness of on-screen colours to be modified, and was most often used to create transparent lighting effects, as seen in *Ristar*, *Vectorman* and *Ranger-X*. Because this produces shades outside of the normal Mega Drive palette, it allows developers to break the 64-colour limit – this *Toy Story* cutscene achieves 163 colours.

SCALING

■ The Atari Lynx and Neo-Geo had the ability to scale sprites built into their hardware, and the SNES could scale and rotate a background layer, but the Mega Drive had no such hardware function. However, the machine was in fact capable of producing scaling effects with clever software programming – this image from *Skitchin'* is just one example of that.

MEGA FACT

■ The Mega Drive hardware formed the basis of three Sega arcade boards: Mega-Tech and Mega Play ran Mega Drive games and System C-2 hosted new ones.

POLYGONS

■ Although the Mega Drive didn't have dedicated 3D hardware, the console was capable of producing a limited number of filled polygons using software alone. This was commonly used in flight simulators, as well as a limited number of racing games. *Virtua Racing* doesn't count though, as it used the Sega Virtua Processor enhancement chip.

Under the hood

Take a peek at the chips that power your 16-bit dreams

MOTOROLA 68000

■ This is the main processor for the Mega Drive, a 16-bit CPU that had been a staple of Sega's arcade games since 1985.

RAM

■ Two 32KB chips supply the Mega Drive's memory. RAM prices and availability were volatile in 1988, so the PCB is designed to accommodate both wide and narrow chips to hedge against shortages.

ZILOG Z80

■ This 8-bit CPU is included as a sound coprocessor, though not every game actually uses it. This chip's inclusion is crucial for providing backwards compatibility with Master System games.

SEGA 315-5313

■ This is the visual display processor – the graphical heart of the Mega Drive, which handles two scrolling background layers plus sprites.

YAMAHA YM2612

■ This is the sound synthesiser chip used by Mega Drive games, providing up to six channels of FM sound. Sampled PCM sounds are also supported, for effects such as drum beats and speech.

» [Mega Drive] Konami was one of the many publishers that took a few years to hop on the Mega Drive bandwagon.

» [Mega Drive] *Landstalker*'s isometric visuals were remarkable to Rieko Kodama back in the Nineties.

MEGA FACT

■ Because the Mega Drive removed SG-1000 graphics modes, it can't run the Master System game *F-16 Fighting Falcon* – even with a Power Base Converter.

▶ only adopted FM sound chips in any capacity in 1985, and the FM sound add-on for the Master System (released in 1987) cost more than any standard game for the console.

Two dominant sound engines emerged for the Mega Drive. Sega developed SMPS in Japan, which was compatible with both the Z80 and 68000 but required composers to essentially be programmers as well. Sega's American branch had GEMS (Genesis Editor for Music And Sound Effects) developed, which supported a sequencer setup that was much easier on composers. This became used in many non-Japanese games. However, many third parties chose to use their own sound engines – Krisalis wrote a popular engine licensed to a number of developers, EA and Accolade both created their own tools, and Namco and Konami did the same in Japan.

The Mega Drive was designed for a range of connection options, most of which were previewed but never reached the market. These include a graphics tablet, a keyboard, a printer and a floppy disk drive. The one that mattered the most was the control pad. This went through a variety of designs, but all sketches included two major features – a three-button layout which took after the arcade JAMMA standard, and a curved design, quite unlike most official pads beforehand. This enabled designers to implement greater control complexity than in other console games, but it wouldn't suffice for the entire generation and a six-button model was introduced in 1993.

» [Mega Drive] American development studios like Sega Technical Institute were essential to satisfy demand for games.

"The biggest early driver of hardware sales was Sonic"

Mark Cerny

But for all of the Mega Drive's technical capabilities, the system is nothing without its games. "The software sells the hardware – if there are no good games then of course the console will not be a success," Mark reminds us. Though Sega would still develop many games in Japan, one of Sega Of America's major innovations was to establish local development studios to better cater for non-Japanese tastes, which would prove to be vital as the machine was vastly more popular outside of Japan.

Japanese designers were aware of the Mega Drive's international success, but continued to work as normal. "I felt its popularity in the West when I heard about *Sonic*'s very good sales. At the time, I also heard that *Phantasy Star* was more popular in the West than in Japan," says Kodama. "That didn't have any particular influence on our design choices, but for creatures such as dragons that appear in RPGs, I bought and referred to illustration compilations from *Dungeons & Dragons* to HR Giger. So, you could say in general I was affected by Western illustrations and design."

Mark was at the forefront of the American development charge as he set up the Sega Technical Institute, which would go on to produce games including *Kid Chameleon*, *Sonic The Hedgehog 2* and *Comix Zone*. Other American studios included Sega Interactive and Sega Midwest Studio, and Sega would often contract external studios including BlueSky Software. Interestingly, despite having developed recognisable games, Mark remains unsure of the significance of the US-based teams in the Mega Drive's success. "The biggest early driver of hardware sales was *Sonic The Hedgehog*, which was developed at Sega headquarters in Japan," he explains, indicating a preference for the killer app theory. "The Sega Technical Institute and other US-based teams did some later work and helped keep the momentum going, but I suspect that the apart from the *Sonic* sequels, the impact of our efforts was pretty minor compared to that initial push."

Takashi Iizuka would work on both sides of the Pacific. "The first game I participated in development on was *Golden Axe III*, but I was there more for help and everything was such a new experience to me that nothing really felt 'difficult' to me," explains the game designer, who joined Sega straight out of university. "I did learn many of the limitations of the hardware while working on that title, from not being able to display a lot of sprites on screen, or having only two scrolling layers, or not being able to expand or shrink things," he recalls. "Shortly after that, during the development of *Sonic 3* I learned that all of the limitations can be addressed through the ▶

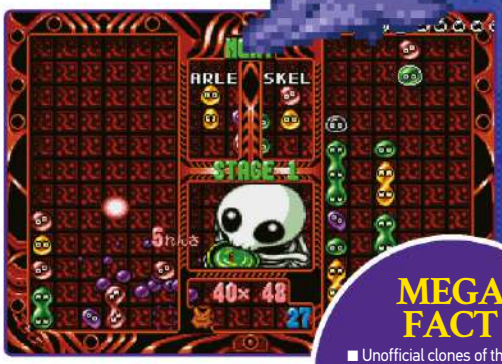
"We kept our plans secret and had been developing games for a year before our debut at CES"

Trip Hawkins

▶ programmer's knowledge and ingenuity which unlocked the potential of the Mega Drive."

Having joined a renowned group of Japanese colleagues at STI, Iizuka was able to aim high. "There were technical limitations to the Mega Drive hardware, but there were also ways of creatively finding a solution. So, when I designed games I never forced myself to consider limitations. If I put these restrictions in place from the beginning, all I would end up doing is limiting my ideas and imagination," he recalls. "For example, the large airship that flies by in the early part of *Sonic 3* – there was no way the Mega Drive could have displayed a sprite that large, but we were able to display the airship in the game. We did it by removing one scrolling layer in a way one wouldn't notice a bit before we wanted to show the airship, then we used that extra layer to show this airship flying right past Sonic."

Still, hardware limitations were far from the only challenge Sega's designers faced. "People nowadays may find this hard to believe, but we didn't even have Windows PCs back when we were developing Mega Drive games. Game design all happened with only a pencil and some paper," Iizuka reveals. "We would draw a map out on graph paper all taped together, then match up the desired map design with the boxes on the graph paper and try and mentally simulate how that would look when digitized for display on a screen.



» [Mega Drive] The *Puyo Puyo* games were easily ported as the arcade games used Mega Drive tech.

The only ones who had access to Sega's Digitizer were the artists who spent their days drawing pixel by pixel, not the designers."

Sega didn't have the means to satisfy a mass audience alone, so third-party support was crucial. However, it was slow to arrive. By the Mega Drive's first anniversary in 1989, the only non-Sega games in Japan were *Thunder Force II* and *Super Hydlide*. Third-party releases didn't become a monthly occurrence until the middle of 1990. At that point, EA would show its hand. "We kept our plans secret and had been developing games for a year before our debut at the June 1990 CES in Chicago," recalls Trip. EA's reverse-engineered 'Sprobe' development kit enabled the company to get the jump on the competition – but as Trip saw it, the competition wasn't fierce. "In theory, that gave us a one-year lead; but for the next two years the industry continued to be sceptical about Sega while I was forcing my producers to start at least three new Sega games every month."

Why did teams shy away from the growing platform? "Of course, all console software companies were counting on Nintendo," Trip points out, "and many of the computer software companies continued to avoid consoles due to the restrictive licences and costly ROM chips." Indeed, Sega was not much friendlier to third parties than Nintendo – the company typically wanted to control cartridge production and asked for hefty licensing fees. Sega also had a set of guidelines that prohibited certain themes. As a result, many companies were late entrants into the market.

EA's demonstration of its ability to create Mega Drive games without a licence earned it major exemptions. "We were not subject to any of Sega's rules, most of which they had copied from Nintendo. We were entirely outside their program, doing our own thing – we only had to take care in the use of their trademarks in our marketing materials," Trip explains. EA was able to manufacture its own cartridges (with distinctive yellow tabs) and get around concept approvals, and the company would go on to publish over 100 Mega Drive games between 1990 and 1997. Other companies would eventually get their own deals along these lines – Acclaim and Konami had their own cartridges that followed Sega's specs, while the likes of Accolade and Codemasters created cartridges with distinctive shapes.

MEGA FACT

■ Unofficial clones of the Mega Drive were in circulation as early as 1993, with the Scorpion XVI infamously appearing on the UK TV show *Bad Influence*.

With hundreds of games having been developed for the Mega Drive, we're curious to know which games caught the eyes of the developers. While Matt cites Mark Cerny and Yuji Naka as programming heroes, it's a UK development that awes him. "A game that has stuck in my mind is *Sonic 3D*, for its FMV running from cartridge," he explains. "I've been exposed to the delights of ROM access times, and the glitches and lockups caused by trying to stream data from the cartridge too fast. I've since learned of the tricks they used to stream that FMV, and it only makes it more impressive."

Iizuka didn't have to look far to find something impressive. "At the time I was working on *Sonic 3* with other Japanese

» [Mega Drive] The arcade board that ran *Golden Axe* used the same CPU as the Mega Drive, albeit at a faster speed.

» [Mega Drive] Amongst her own games, Rieko Kodama counts *Altered Beast* and *Phantasy Star IV* as favourites.

» [Mega Drive] In lieu of early third-party support, Sega would license games from Capcom for conversion to the Mega Drive.

staff at Sega Of America, and in the room next to ours the American staff were working on *Comix Zone*. I thought the idea of having an action game happen within the frame of an American-style comic was fresh and interesting. I played the game a lot when it was in mid-development, but I have never played the final retail version of the game." Kodama's favourite came from Climax Entertainment. "I remember that I was so surprised to see *Landstalker* for the first time," she tells us. "Its pseudo 3D graphics with the quarter view was so unique and the background art and character art was fantastic."

It's fascinating to look back at the design choices that shaped one of the defining consoles of the era. But the truth is that the Mega Drive is so much more than a black box of chips. "Certainly a lot of the nostalgia derives from the software library, but that's not all, Sega crafted such a fun brand image as well! Remember WELCO METOT HENEX TLEVEL? I certainly do," Mark reminisces. "Hard not to smile when you think back to those days." Indeed, three decades on, the Mega Drive still makes us smile – and as non-developers, that doesn't take a 68000 CPU. ✱

Liberty vs security

Security was one of the most controversial aspects of the Mega Drive – here's how one third party broke through it

One of the interesting things about the Mega Drive is its security system. Mega Drive consoles featuring the Trademark Security System (TMSS) expect to read the word 'Sega' at a specific ROM address, and the word also must be written to a designated RAM address before the VDP can be accessed. If these conditions are met, the system will display a message stating that the game was "Produced by or under license from Sega Enterprises Ltd" Originally, this was intended as a region-locking measure – developer manuals referred to it as the "US security code" and early Japanese games were not designed to pass the check. This didn't matter to begin with, as early consoles didn't implement the check.

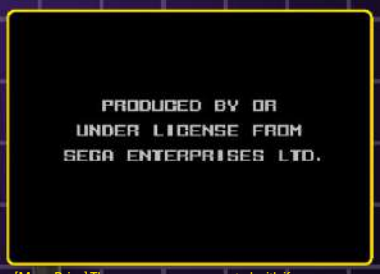
However, third parties wanted to develop for the Mega Drive without agreeing to the costly official licensing terms. Electronic Arts was one of those, and had reverse-engineered the console – with Trip Hawkins confident that EA would win if Sega tried to sue. "I had great lawyers and took the law very seriously. We understood how to correctly manage a clean room to avoid copyright infringement," he explains. "We waited patiently to confirm that the Genesis that debuted in the US in 1989 and as the Mega Drive in Europe in 1990 did not make any changes to the Japanese version that we had figured out. By comparison, while we also reverse-engineered the NES, we did not release any games based on this work because we could not find a way around the patented NES security chip."

Ultimately, this wasn't a fight that EA had, as its reverse-engineering earned the company a preferential licensing deal. However, Accolade took the unlicensed route when it released *Ishido: The Way Of Stones* and incurred Sega's wrath. "I was not surprised by Accolade's approach but when I went to visit them and compare notes I learned that they lacked legal sophistication," Trip remembers. "I gave them some advice and offered to collaborate but they went their own way." Sega implemented the TMSS check in newly manufactured Mega Drives, and Accolade coded its next releases to pass the check.

» [Mega Drive] It was Accolade's *Ishido: The Way Of The Stones* that caught Sega's eye and provoked a legal case.

Sega launched a series of legal actions in response, alleging unfair competition, copyright infringement for using the TMSS code, and trademark infringement because Accolade's games triggered a message stating that they were licensed by Sega. Accolade filed a counterclaim, alleging that Sega's TMSS screen falsified the source of its games. Judge Barbara A Caulfield initially ruled in favour of Sega, dismissing Accolade's argument of fair use due as its games were made for profit and competed in the marketplace with Sega's games. However, the decision was appealed. Judge Stephen Reinhardt overturned the earlier verdict, noting that non-expressive functional principles are not protected under US copyright law and that the TMSS code was required for a game to function. Any trademark infringement was considered to be inadvertently triggered by this fair use act, and that Sega was at fault for designing a system that would falsely label the product.

Sega was dissatisfied with the outcome and petitioned for a rehearing, but ultimately the two sides settled under undisclosed terms in April 1993, bringing a year and a half of legal wrangling to an end. Accolade became a licensed Mega Drive developer, TMSS remained in Mega Drive systems, and a more specific method of region locking was ultimately implemented.



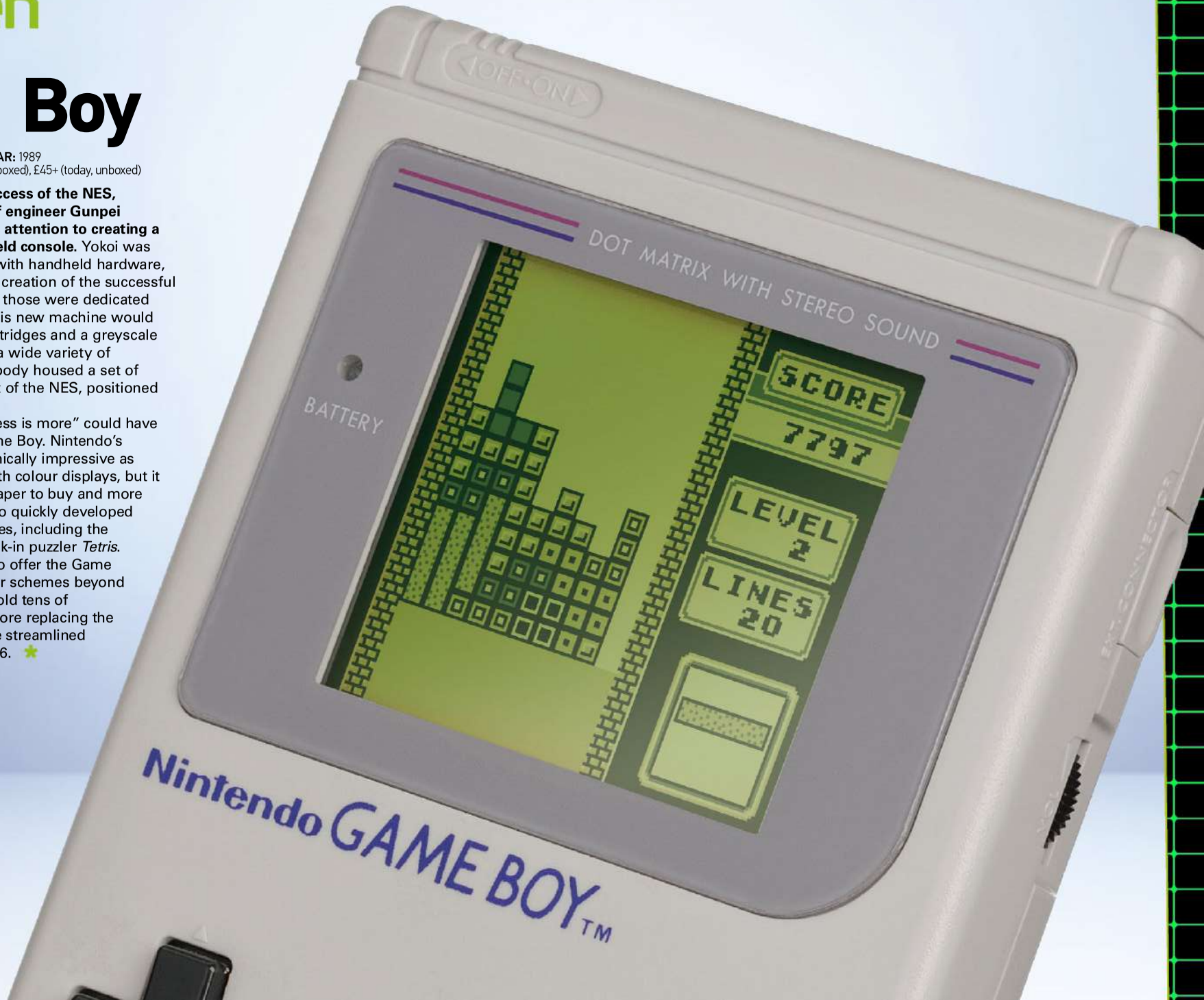
» [Mega Drive] The screen you were greeted with if everything was working correctly.

Game Boy

» **MANUFACTURER:** Nintendo » **YEAR:** 1989
» **COST:** £69.99 (launch), £80+ (today, boxed), £45+ (today, unboxed)

Following the success of the NES, Nintendo's chief engineer Gunpei Yokoi turned his attention to creating a versatile handheld console. Yokoi was no stranger to success with handheld hardware, having been behind the creation of the successful Game & Watch line, but those were dedicated single-game devices – his new machine would use interchangeable cartridges and a greyscale LCD display to support a wide variety of games. Its simple grey body housed a set of controls identical to that of the NES, positioned underneath the display.

The popular saying "less is more" could have been coined for the Game Boy. Nintendo's machine wasn't as technically impressive as competing machines with colour displays, but it was more portable, cheaper to buy and more economical to run. It also quickly developed a brilliant library of games, including the enormously popular pack-in puzzler *Tetris*. Nintendo would go on to offer the Game Boy in a variety of colour schemes beyond the standard grey and sold tens of millions of consoles, before replacing the standard model with the streamlined Game Boy Pocket in 1996. ★



Game Boy fact

■ The final official release to be compatible with the original Game Boy was *From TV Animation One Piece: Maboroshi No Grand Line Boukenki*, a 2002 action RPG based on the popular manga series.

PROCESSOR: 8-BIT SHARP LR35902 (4.19 MHZ)

GRAPHICS: 160X144 RESOLUTION, FOUR SHADES OF GREY, UP TO 40 SPRITES ON SCREEN SIMULTANEOUSLY

AUDIO: TWO SQUARE WAVE CHANNELS, ONE WAVE CHANNEL, ONE NOISE CHANNEL

POWER: FOUR AA BATTERIES, APPROX 15 HOURS PLAY TIME

MEDIA: ROM CARTRIDGE (UP TO 4MB)

RAM: 16KB

ESSENTIAL GAME

Super Mario Land

There are plenty of games that could lay claim to this spot, but the world's most famous plumber's Game Boy debut is the right choice because it's such a distinctive game. This is a Mario that doesn't play by the rules – one in which you get Super Balls instead of Fire Flowers, one with shoot-'em-up sections, and one with jiangshi (hopping vampires) as enemies. *Tetris* has been improved, *Link's Awakening* has been remade, and you'll struggle to trade Pokémon these days. *Super Mario Land* remains unchanged and proudly odd.

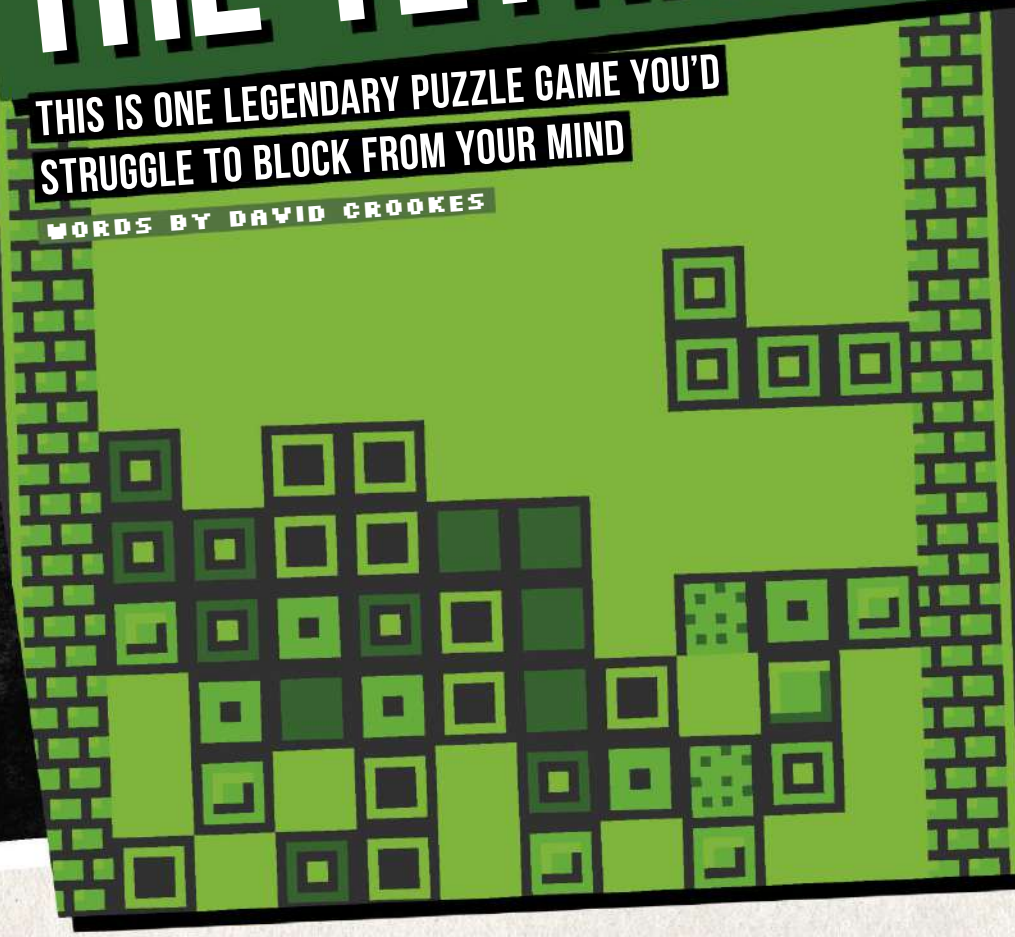
SUPPLIED BY
EVAN AMOS

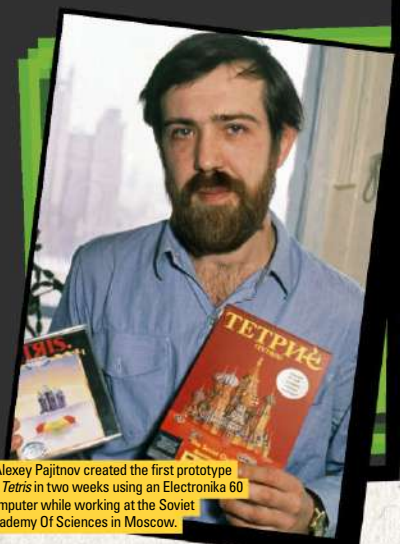
FLASHBACK

THE TETRIS EFFECT

THIS IS ONE LEGENDARY PUZZLE GAME YOU'D STRUGGLE TO BLOCK FROM YOUR MIND

WORDS BY DAVID CROOKES

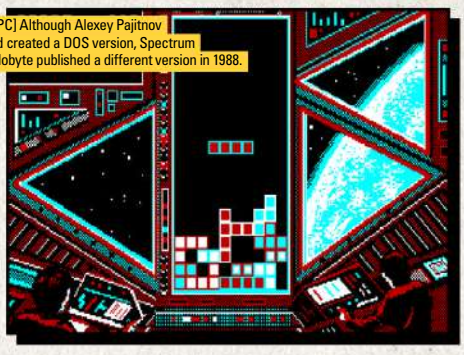




» Alexey Pajitnov created the first prototype of *Tetris* in two weeks using an Electronika 60 computer while working at the Soviet Academy Of Sciences in Moscow.

If the development of *Tetris* itself was a game, then, just like the puzzler, it'd be one you'd play for ages before all of the pieces eventually fell into place. For if there was any game that could be described as a sleeper hit, it's this one, and that's because it fell victim to a heady mix of politics and business for many years.

Tetris was the brainchild of Alexey Pajitnov, a 29-year-old Russian computer engineer who created the strategic puzzle game using text characters on an Elektronica 60 computer at the Soviet Academy Of Sciences in Moscow. Inspired by Pentominoes – a multiplayer board game involving the rotation and reflection of 12 types of five-square pentomino pieces so they'd fit neatly on an 8x8 grid – he created the game simply for his own amusement, but he added a genius twist.



» [PC] Although Alexey Pajitnov had created a DOS version, Spectrum Holobyte published a different version in 1988.

His version would ditch pentominoes in favour of seven tetrominoes (geometric shapes composed of four squares connected orthogonally), and he'd have the pieces fall from the top of the screen. Players would try to arrange the tetrominoes so that they'd form complete rows which would promptly disappear to free up space. This led to a game that was frantic, compelling and fun while instilling a sense of panic, frustration and accomplishment. Anyone who played it (including Alexy) simply couldn't stop.

Released on 6 June 1984, Alexy quickly realised he'd created something special, so he enlisted the assistance of his colleague Dmitry Pavlovsky and a teenage programmer called Vadim Gerasimov to create a colourful version for the PC complete with proper block graphics, levels and a score. This decision proved to be pivotal, and soon it was being enjoyed across Eastern Europe as one of the relatively few games that people were authorised to play.

Even so, *Tetris*' time only truly came when it began to attract interest from the west. This period in *Tetris*' life was marked by a race to gain the rights to publish the game, which involved a host of companies such as Mirrorsoft, Spectrum Holobyte, Andromeda, Bullet-Proof Software and Nintendo. The story has so many twists and turns it could fill a book the size of *War & Peace*. Suffice it to say, the process was akin to playing a game of pass the parcel with people wearing gloves coated in butter, such were the misunderstandings, legal battles and missed opportunities.

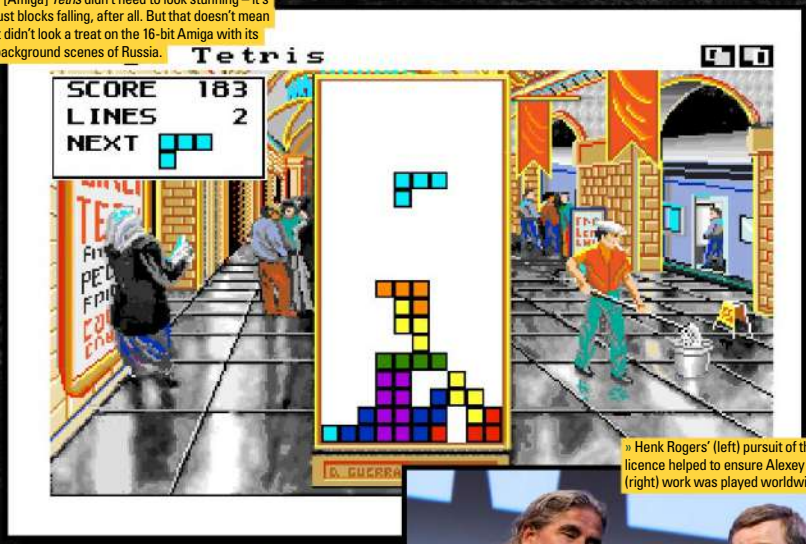
Ultimately, the game was re-made and released on many platforms including the PC, Amiga, Apple II, Apple IIGS, Mac, Atari ST, Commodore 64, ZX Spectrum, BBC Micro and Amstrad CPC. Military-themed backgrounds had to be removed from Spectrum Holobyte's take on the game, and Mirrorsoft's renditions were a mixed bag (the Amstrad CPC port hurt the player's eyes while the Commodore 64 version blessed their ears with a 26-minute music composition by Wally Beben that made clever use of the SID chip). The best, however, was yet to come.

The game's appearance on the Nintendo Game Boy was a game-changer, and it was thanks to the tireless work of Henk Rogers, the founder and CEO of Bullet-Proof Software, who went to great lengths to secure the rights to the game. Henk already had a hand in the

WELL, WELL, WELL

WHAT ALEXY DID NEXT

▶ After creating *Tetris*, Alexey Pajitnov looked to experiment with the game's design, which led him to develop the first official variant: *Welltris*. Programmed with the assistance of Andrei Sgenov, it switched from pieces falling down the screen to pieces falling down four walls into a pit. Once at the bottom, the pieces would slide, and it was up to the player to consider how they'd best slot into place so that vertical or horizontal lines could be formed. Inspired by *Blockout*, developed in Poland by California Dreams, the game was released for DOS in 1989, and it was then ported to a host of 8-bit and 16-bit computers as well as the arcade in the early Nineties. It was widely considered by critics to be a success from a development point-of-view but while it was huge fun to play, it didn't sell anywhere near as well as *Tetris*, which likely accounts for why it's never been officially revisited.



» [Amiga] *Tetris* didn't need to look stunning – it's just blocks falling, after all. But that doesn't mean it didn't look a treat on the 16-bit Amiga with its background scenes of Russia.

» [ZX Spectrum] Rowan Software developed the Spectrum port for Mirrorsoft, alongside versions for the Amstrad CPC, Amiga, Atari ST, BBC Micro, Commodore 64, MSX and others.

» Henk Rogers' (left) pursuit of the *Tetris* licence helped to ensure Alexey Pajitnov's (right) work was played worldwide.

development of *Tetris* on the NES: he'd given Tengen the nod to create a gorgeous-looking game with cooperative, versus and with-computer modes that has long been said to be one of the finest ports. And now he was giving Nintendo the go-ahead to create what would be the Game Boy's killer app.

Nintendo made the most of *Tetris*, bundling it with the handheld console in 1989 at the expense of *Super Mario Land*. *Tetris* showed that it didn't matter if the Game Boy had a relatively small, monochrome screen. The fact it was easy to control, posed an ongoing challenge and could be enjoyed for any length of time made it great for gaming on the go. It also had a two-player mode that allowed a couple of players to hook up their handhelds and try to stay in the game the longest. With points to play for, there was also an incentive for anyone to keep going.

As it happened, the Tengen version for the NES was subsequently pulled from the shelves because the licence had been granted in error. But Nintendo commissioned its own version for the console and upped the ante by speeding up the gameplay whenever lines were cleared.

This put an even greater emphasis on a player's ability to react to the falling pieces and it became a much-loved aspect of the game on the system. As sales topped 1.5 million in the first six months, adding to the millions more sold on the Game Boy, a legend was truly born. An enthusiastic community emerged, and *Tetris* was put on a path that seems to be never-ending – there are now more than 200 variants of what's often called the finest puzzle game of all time. ✱

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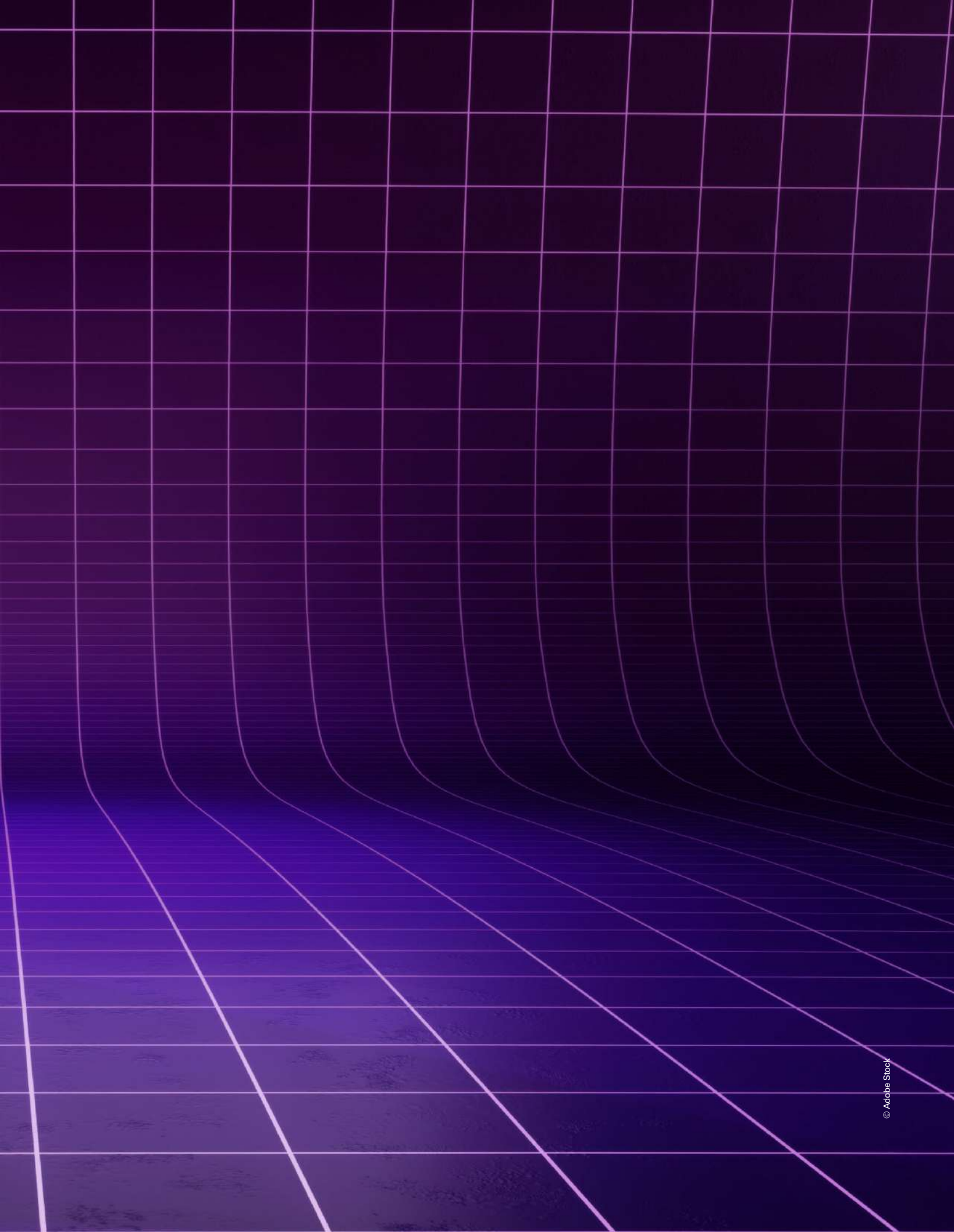

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